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ABSTRACT

This report summarizes the design strategy and preliminary conclusions from the first year of a study that attempted to identify educational factors that produce the differences in student achievement between unusually high-performing schools and unusually low-performing schools of similar socioeconomic characteristics. The sample included 21 pairs of schools from throughout California. Data were collected through questionnaires, interviews, and observation of ten teachers and the principal of each school studied. Among the most evident findings was the importance of teacher perception of administrative support. The presence of a well-defined agreement and understanding between teachers and principals regarding the locus of responsibility and authority at higher-achieving schools was noted. The study also noted very different classroom behaviors exhibited by teachers in higher-achieving schools and different grouping practices between higher- and lower-achieving schools. Furthermore, higher-achieving schools reported spending more time on social studies instruction and less time on mathematics. (Author/JG)

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California School Effectiveness Study

The First Year: 1974-75

A Report to the California Legislature as Required by Education Code Section 12851

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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EA 010 369

CALIFORNIA STATE DEPARTMENT OF EDUCATION/Wilson Riles, Superintendent of Public Instruction/Sacramento, 1977

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Legislation Requiring This Report

Assembly Bill No. 2945

CHAPTER 690

An act to amend Section 12851 of the Education Code, relating to schools, making an appropriation therefor, and declaring the urgency thereof, to take effect immediately.

[Approved by Governor August 30, 1976. Filed with Secretary of State August 30, 1976.]

I am deleting the $50,000 appropriation contained in Section 2 of Assembly Bill No. 2945

I believe the money necessary to complete this study can be obtained from the Department's existing resources.

With the above deletion, I approve Assembly Bill No. 2945.

EDMUND G. BROWN JR., Governor

LEGISLATIVE COUNSEL'S DIGEST

AB 2945, Greene. Schools: performance study.

Under current law, the Superintendent of Public Instruction is required to issue a final report regarding school performance to the Legislature by January 5, 1976.

This bill would extend the date for the submission of the final report to January 5, 1978; would require that a specified study plan be submitted to the Legislature by July 1, 1976; and would extend the period over which a designated study of school districts is to be conducted from 2 years to 3 years.

This bill would also appropriate $50,000 from the General Fund to the Superintendent of Public Instruction for the purposes of conducting the study leading to this report.

This bill would take effect immediately as an urgency statute.

Appropriation: yes.

The people of the State of California do enact as follows:

SECTION 1. Section 12851 of the Education Code is amended to read:

12851. The Superintendent of Public Instruction shall perform an analysis of selected schools to identify educational factors which produce the distinction between unusually high-performing districts and unusually low-performing districts, such performance as measured by standard measures of school achievement.

The schools selected for study shall be comparable in social and demographic characteristics and shall vary only on student attainment.

The study shall last three calendar years so that variables discovered the first year may be verified the second and third years.

The Superintendent of Public Instruction shall report to the Legislature by January 5, 1975, on the identification and description of those socioeconomic, financial, and educational variables affecting school performance which tend to distinguish between unusually high-performing districts and unusually low-performing districts. By January 5, 1976, the Superintendent of Public Instruction shall issue a report to the Legislature including information regarding the verifiability of the relative impact of the variables discovered during the first year of the study.

The California School Effectiveness Study

Executive Summary

For a number of years, educators have been attempting to identify factors which make a difference in the educational achievement of students. The School Effectiveness Study was funded by the California Legislature in 1973 (Chapter 1094, Statutes of 1973) to continue the search for school factors which relate to achievement. This is an interim report which summarizes a design strategy and preliminary conclusions based on the first year of study (1974-75). This interim report will be followed by a final report summarizing the second-phase study. That report is scheduled for publication in January, 1978.

Typically, studies in educational research have found that a large portion of differences in student achievement is derived from background variables--such as family income and parents' occupational status--which describe the student body. Students from families with income higher than average achieve, on the whole, at a much higher level than do students from low-income families. Therefore, studies of school achievement must be carefully designed to ensure that only schools with students from similar backgrounds are compared.

The School Effectiveness Study, designed with the importance of family influences in mind, compared only similar schools. The selected sample included 21 pairs of schools. Each pair was chosen so that one member of the pair was from a school whose sixth grade students had scored higher than was predicted on the basis of the characteristics of the students in attendance. Within the same pair the students from the second school scored far lower than had been predicted. Therefore, the conclusion to be drawn is that the schools involved must have been responsible for the achievement difference. The School Effectiveness Study set out to determine how these schools differed in their approach to schooling.

Since the definitions of higher and lower achievement are relative to the initial prediction for a school and are based on the types of students in attendance, it is often true that students at the higher-achieving school of one pair may actually be scoring lower than those at the lower-achieving school of another pair. In the study Pair C was composed of two city schools in low-income areas, and Pair V consisted of two suburban schools in high-income areas. The scores of the higher- and lower-achieving members of each pair are represented in Table ES-1. As Table ES-1 shows, students at the lower-achieving school in Pair V actually obtained higher average scores than those at the higher-achieving school in Pair C. Therefore, it would be incorrect to compare schools without reference to the characteristics of the children in attendance. In this study we have compared only schools with similar types of students.

In addition to test scores, the State Department of Education gathered extensive background information from each school on school size, the socio-economic status of enrolled children, the percentage of minority students, and the type of locality. Pairs of similar schools were selected for the high, medium, and low levels of each of these four factors.

For an assessment of the difference between higher- and lower-achieving schools, a number of different procedures was used. Questionnaires were sent to a sample of ten teachers and the principal of each school; each of the ten teachers and the principal were interviewed; and the ten classrooms of those teachers were observed and photographed. Additionally, fiscal data were collected, but lack of consistency at the school level forced the cancellation of analysis of the fiscal data. The responses to the interviews, questionnaires, and observations were analyzed statistically by means of a comparison of the higher-achieving schools' responses with the lower-achieving schools' responses. This analysis led to development of findings in three major categories: staff characteristics, measures of student and staff contact, and organizational processes.

Staff Characteristics

The School Effectiveness Study revealed that principals in higher-achieving schools reported having much more experience as principals at their schools and generally being more satisfied with their position as principal than were those in lower-achieving schools. Principals in higher-achieving schools were assessed by the teachers in those schools as having more influence over curriculum development and hiring policies. Teachers at higher-achieving schools rated their principals higher on both general performance standards and specific standards of helpfulness and support.

TABLE ES-1

Sixth Grade California Assessment Program
Reading and Mathematics Scores, 1974-75

School	Scores in subject areas		
	Level	Reading	Mathematics
Pair C	Higher-achieving school	50.0	62.8
	Lower-achieving school	36.7	49.8
Pair V	Higher-achieving school	69.2	83.7
	Lower-achieving school	56.4	70.5

Teachers at higher-achieving schools reported being slightly older, having more years of teaching experience, and having obtained more college credits since beginning teaching. They also believed their faculty as a whole had less influence on some school-level decisions than did teachers at lower-achieving schools. In general, teachers at higher-achieving schools perceived their influence on the whole to be less than the influence perceived by faculty at lower-achieving schools. Teachers at higher-achieving schools reported being more satisfied with various aspects of school than were teachers at lower-achieving schools.

Although no relationship was discernible between achievement and the number of counselors employed, schools differed significantly as to employment of counselors. Among low socioeconomic status (SES) schools, the lower-achievement schools had more counselors; among high SES schools, the higher-achievement schools had more counselors.

In the area of aides and volunteers, a number of interesting relationships were discovered. Low SES schools had twice as many paid aides per teacher as did middle and high SES schools. Teachers from higher-achieving schools reported using aides significantly more for noninstructional tasks. Higher-achieving schools had slightly more adult volunteers than did lower-achieving schools, and both high and low SES schools had twice as many adult volunteers as did schools in the middle SES range.

Teachers from higher-achieving schools reported greater district influence over curriculum and teacher hiring than did teachers from lower-achieving schools. Teachers in higher-achieving schools also rated district administration higher in instructional leadership and allocation of materials and resources and lower in effecting group involvement in school decision making.

Although teachers from lower-achieving schools reported themselves as having more influence over teacher hiring than did teachers from higher-achieving schools, principals from lower-achieving schools did not support that contention. By comparison, principals and teachers at higher-achieving schools tended to agree in their assessments of the locus of decision making. Furthermore, teachers at the higher-achieving schools rated their principals higher on all criteria and responded more positively than did teachers in lower-achieving schools regarding their relationship with their principal.

Measures of Contact Between Students and Staff

In terms of instructional time spent in various subjects, teachers at higher-achieving schools reported spending slightly less total time in classroom instruction, more time on social studies, less time on mathematics, and about the same amount of time on reading and language development and on science.

Instructional and Organizational Characteristics

Observers perceived students in higher-achieving schools to have more opportunities than did students in lower-achieving schools to decide for themselves about varying their tasks and activities. These students were perceived to be happier, more engaged in their work, and less disruptive, restless, or bored.

Teachers at higher-achieving schools reported placing more emphasis on students' academic performance in reading and mathematics. Teachers at higher-achieving schools reported dividing their classes into several groups working at different paces, while teachers at lower-achieving schools more frequently reported individualization of instruction. The reasons for this finding are far from clear. The data are based on what local schools described as "individualization" together with some direct observation. The data have not systematically assessed the actual extent of implementation of individualized instruction.

Principals were also questioned about changes over the past five years in the reading or mathematics curriculum. Although higher-achieving schools reported virtually no changes, lower-achieving schools reported a moderate amount of change in both curricula.

Implications and Recommendations

Among the most evident findings of this study was the importance of teacher perception of administrative support. The presence of a well-defined agreement and understanding between teachers and principals regarding the locus of responsibility and authority at higher-achieving schools was also noted. This study also noted very different classroom behaviors exhibited by teachers in higher-achieving schools and different grouping practices between higher- and lower-achieving schools. Furthermore, higher-achieving schools reported spending more time on social studies instruction and less time on mathematics.

In the course of the study, areas for further study have been identified, including further assessment of the role of mathematics instructional time in affecting achievement; systematic study and observation of the effects of individualized instruction; collection of additional information on the quality and extent of training for aides; and further analysis of patterns of summer school attendance. The State Department of Education will be analyzing some aspects of these issues in coming months. Meanwhile, it is hoped that school administrators, teachers, and educational researchers will find the study beneficial as they pursue their respective goals in the educational community.

Chapter I
Introduction to the Study

The California Legislature authorized funding of the School Effectiveness Study to identify the socioeconomic, financial, and educational variables affecting student achievement in a set of specially selected schools (Chapter 1094, Statutes of 1973). Designed and conducted by the California State Department of Education during 1974-75, this study examines those factors that distinguish schools in which student achievement scores are unusually high from those schools in which student achievement scores are unusually low.

Other studies have determined that a large portion of the differences in student achievement in the schools is derived from the background variables which describe the student body. For example, preliminary analysis of 1973-74 sixth grade student achievement scores in 4,000 California elementary schools showed that 65 percent of the variation among schools could be explained by a single index of students' average socioeconomic status. That is, schools having higher student achievement scores were generally composed of students from families with higher socioeconomic status. When additional background indices were considered, 75 percent of the variation was explained statistically by a regression equation.* These results, which suggest the strong influence of family status on achievement, are consistent with findings from other studies.

In contrast to those studies which isolate socioeconomic factors, however, this study is designed to isolate specific educational factors that influence achievement. Consequently, the present study has two purposes: (1) to isolate additional information about those school factors capable of affecting achievement from those environmental and background factors that strongly affect that achievement; and (2) to improve sampling procedures that can be used to further school effectiveness and studies of student achievement.

The first purpose of the School Effectiveness Study, then, is to shed light on the fact that some schools continually attain higher student achievement levels than do other schools, even when the vitally important background factors for both groups are virtually identical. As a result of the second purpose, the identification of the educational and financial factors that influence student success and are controllable by the schools became the focus of the study. Identification of such factors is important for determining local educational policies and has subsequent implications for the reform of the entire state school finance system. However, an attempt was made only to describe the relationship between school factors and achievement; no attempt was made to specify the cause and effect of either higher or lower

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*For a definition of regression analysis and the definitions of certain other statistical terms, see Appendix B. Terms used in this report that are marked with an asterisk are defined in Appendix B.

student achievement. Examination of the natural variation* among schools is simply inadequate for that purpose. Nevertheless, the study does, in fact, include specific findings about some educational factors which do influence student achievement. At the same time the study develops some new stages in educational research, thus preparing the way for further study of those educational factors influencing student achievement.

The remainder of this report consists of four chapters. Chapter II contains a review of previous research in this area. Both earlier studies and the progressively complex research designs used to study school effectiveness are described. Chapter III contains a description of the research procedures and school selection criteria used in this study as well as design and methodology, identification of variables, development of research instruments, and overall data analysis plan. Chapter IV contains the significant findings of the study and a general discussion related to the findings; and Chapter V, the last chapter, contains more specific conclusions as well as an assessment of the implications and policy considerations to be derived from this study.

Although the present study contains much information of value for assessing the factors which influence achievement, it remains an interim report. A second set of observations has been conducted at a smaller sample of selected schools to verify the findings of the first-year study and provide additional information regarding those findings. In the second phase of this study, different methodology, including primary use of the anthropological method of nonparticipant observation, is used in an attempt to explain further the ramifications of the first-year findings.

The final report of the second phase of the School Effectiveness Study is expected to be available in January, 1978.

Chapter II
Review of the Literature on School Effectiveness

This review of the literature* on school effectiveness contains a brief analysis of some of the more important trends and studies in the field. At the same time a synthesis of a sampling of the critical literature and an analysis of the underlying models of these studies are presented. An attempt is made to discover the strengths and weaknesses of the models and to suggest possible improvements for future studies. The review is designed to provide a context that will clarify the contributions which this study makes to an understanding of school effectiveness.

Because the School Effectiveness Study has two important purposes--the search for program characteristics related to student achievement and the development of a sophisticated sample selection process--the review of the literature is divided into two parts. Part A contains a review of school effectiveness research designs; Part B, a brief survey of findings from previous representative studies of educational variables related to achievement. The first part of the review is a chronological survey of progress in research design, and the second part is a categorical breakdown of variables organized parallel to the conclusions and discussions of Chapter IV.

A. Chronological Survey of Progress in Research Designs for School Effectiveness Studies

For a number of years, educators have been attempting to discover those factors which make a difference in the educational achievement of students. Recently, that effort has been accelerated for at least two reasons: (1) the significant concern, evidenced especially in the 1960s and exemplified by the mandate which produced the Coleman Report,* that students in every segment of society have an equal opportunity to receive educational benefits; and (2) the pressure placed on state and local government by tight budgets.

1. The Earlier Years

Among the earliest studies in school effectiveness were the cost-quality analyses conducted by Mort. Using expenditures as a measure of school excellence, Mort and a number of other early researchers found that in school districts with greater expenditures, students tended to achieve at a much higher level.

Although the work of Mort and his immediate followers was considered a breakthrough in educational research, subsequent researchers realized that the original cost-quality studies were deficient in not accounting for experiences outside the school which could differentially affect achievement. Among the first to include these socioeconomic considerations was Wilson (1959), who analyzed the links between social class and aspirations (as a proxy for the usual dependent variable* of achievement). The California Senate Fact Finding Committee on Revenue and Taxation (1965) conducted a subsequent study of the relationship between socioeconomic status, school

factors, and school achievement. From an analysis of 25 independent variables* representing school and socioeconomic characteristics and the dependent variable of scores on a reading achievement test, the researchers concluded that a positive relationship existed between teacher experience and student achievement independent of the link between the students' home environment and achievement. This study was one of the early attempts to suggest specific educational factors that might influence achievement.

2. The Coleman Report

However, with the publication of Equality of Educational Opportunity (Coleman, 1966), researchers turned their attention away from the nonenvironmental factors influencing achievement. After two years of research, which included a sampling of 900,000 students on achievement and aptitude tests, questionnaires on family background, and collection of data from administrators and teachers at each of the schools included in this study, the findings included the statement that:

> Taking all these results together, one implication stands out above all: that schools bring little influence to bear upon a child's achievement that is independent of his background and general social context; and that this very lack of independent effect means that the inequalities imposed upon children by their home, neighborhood, and peer environment are carried along to become the inequalities with which they confront adult life at the end of school. (p. 325)

The Equality of Educational Opportunity report was originally designed to fulfill a congressional mandate of the Civil Rights Act of 1964 to report to Congress on the availability of equal educational opportunities for persons of all races, creeds, colors, and national origins. Its publication set off a furor in educational circles. The furor arose about what public policy conclusions should properly be drawn from a report that many believed indicated that "schools do not make a difference" and, therefore, that spending for education could be maintained at current levels or could even be reduced without affecting academic achievement or equality of educational opportunity.

Others (Guthrie, 1973; Hanushek and Kain, 1972; Bowles and Levin, 1968) reached quite different conclusions. Although these educators praised the Coleman report for its magnitude and scope, they asserted that its sampling, methodology, and statistics prevented the use of its data for policy purposes. Basically, they criticized: (1) inadequacy of the sample and effect of nonresponse rates; (2) limitations of questions asked on the survey instruments; and (3) inadequacy of controls in the analysis stage of relating school inputs to student performance. Educators hoped that such strong criticism would advance the art of data collection and appropriate analysis of the data.

Because the Coleman report had relied so heavily on the statistical technique of regression analysis, it became the predominant mode of analysis. In this form of analysis, achievement scores are set up as the dependent variable, and researchers use regression methods to estimate the proportion of weight which each independent variable contributes to the total achievement score. Among the researchers who published studies in this style were

Burkhead (1967), Cohn (1968), Hanushek (1968), Katzman (1968), Raymond (1968), Bowles (1969), Bowles and Levin (1968), Ribich (1968), and Kiesling (1969). In each study the researcher tried to control the home environment of students statistically to show which school variables were most important in determining achievement. These researchers identified a number of variables ranging from less consequential items such as the median age of school buildings to more essential ones such as teacher experience, student expectations, and the student-staff ratio. Although no absolute consensus was reached regarding the definitive mix and proportion of various school services, two things that did become apparent in these studies were (1) that a fair degree of consistency was evident in the studies' findings; and (2) that school services could play an important role in affecting achievement.

In 1971 Guthrie reviewed the majority of such studies conducted during 1965--68. In his summary of these works, he rank-ordered four major areas of consensus among researchers. He identified four areas of educational factors influencing achievement:

1. Variables relating to the number of professional staff members and their characteristics, such as verbal ability, experience, and amount and type of academic preparation

2. Measures of contact between students and professional staff, including student-staff ratios, classroom size, school or district size, and length of school year

3. Service components, such as age of school buildings and adequacy and extent of physical facilities for instruction

4. Spending levels of various factors, including expenditures per pupil and teachers' salary level

Although Guthrie's conclusions were optimistic, researchers remained cognizant of the continuing inadequacies as well as the advances in educational research. These researchers were well aware that, although some school effects had become apparent, much information continued to be lost because of the lack of sophistication of the estimation models (i.e., the model of linear regression).

For example, one type of shortcoming was that status rather than process variables were measured. The difference between the two is quite important in a school setting where the interaction between student and teacher is integral to the educational process. Status variables generally represent objective, measurable characteristics such as age, years of education, length of school day, highest academic degree received, or student-staff ratio. Process variables represent much more subjective, less easily quantifiable areas such as the quality of instruction, the attitudes which students bring to school, the relationships and balance of authority between principals and teachers, and the balance of the control assumed by parents and other community persons in school decisions. The development of the distinction between status and process variables marked a step forward in education research by refining the researcher's ability to study specific school factors influencing student achievement.

3. High-Low Studies

Another new avenue of inquiry opened up about 1972. Researchers developed methods for composing predictions of achievement from several key variables. In turn these researchers were able to assess school effects in reference to the level of achievement predicted for that school. As a consequence a number of states began designing "high-low" studies, which isolated pairs of schools in which children came from families of equivalent socioeconomic status[1] yet whose scores on standardized achievement tests were widely disparate. This methodology was designed to neutralize the impact of cultural and social factors upon school achievement so that researchers could concentrate on school factors which influenced the school's effectiveness. In addition to the comparison with normalcy, this approach also placed educational research one step closer to a controlled laboratory setting rather than the naturalistic, uncontrolled setting in which most educational research had hitherto been conducted.

One of the first of such studies attempting to measure relative performance was conducted by White (1972), who used 1970-71 and 1971-72 data for the Atlanta school system. The researchers began by setting up a scatterplot* of achievement against the percentage of free and reduced-price lunch participation (as a proxy for socioeconomic status) for all schools and grades studied. Then the researchers used statistical techniques to establish the curve of best fit. Subsequently, parallel bands were drawn above and below the regression line at 15 percent and 25 percent intervals. The schools were given "signals" (red or blue full- or half-shaded symbols) to identify in which of the five bands[2] that school was situated.[3]

Relative performance levels similar to those defined in Atlanta were first used for analysis of school effectiveness in New York State (1974). After matching inner-city students by characteristics of median family income, percentage of families on welfare, and several other indicators of socioeconomic status, two inner-city schools were paired for study. In one

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[1] As measured by variables such as median family income, pupil ethnicity, percent bilingual, pupil mobility, and family breadwinner's occupation.

[2] Achievement bands: (1) more than 25 percent below prediction; (2) between 15 and 25 percent below prediction; (3) between 15 percent below and 15 percent above prediction; (4) between 15 and 25 percent above prediction; and (5) more than 25 percent above prediction.

[3] The Urban Institute then made the relative performance information widely available within the Atlanta school system and observed the influence of this information on decision making in areas related to student performance. For further information on the results of this study, see Bayla F. White and others, The Atlanta Project: How One Large System Responded to Performance Information (Washington, D.C.: The Urban Institute, March, 1974).

of these schools, students had scores consistently high[4]; in the second school, students had scores consistently low.[5] Intensive interviews and observations focused on the major areas of administrative and teacher characteristics, reading curriculum and instruction, and school and classroom climate. The team of researchers concluded that the differences in the two schools were "primarily attributable to administrative policies, behaviors, procedures, and practices" which were controllable at the school level. Both the administering team's instructional and management skills as well as their attitude and optimism toward the children's learning ability combined to make the school one in which children scored well above their predicted achievement levels.

In contrast a number of areas intuitively viewed as determinants of success did not vary significantly. These included effectiveness and "appropriateness of the teaching, training and experience of teachers, appropriateness and availability of materials, and approaches to reading instruction." Although some findings of this study contradicted commonsense notions, their value lay in the revelation that process variables could be assessed and that additional research in this vein was indeed worthwhile.

The Massachusetts Advisory Council on Education (MACE) broadened the research of the New York staff when the council contracted with the Educational Research Corporation (ERC) to construct a similar, but slightly larger, study which paired "successful" and "contrast" schools to assess the critical features for effective learning (Ellis, 1975). In this instance also, the study focused on 20 inner-city schools in which the average achievement of half the schools was at or above grade level in comparison with national norms. The average reading scores in the second half were 1.3 grade equivalents below national norms. These differences occurred even though the schools were paired after being matched for measurements of poverty, racial composition, and proportion of bilingual students. In five-day visits to each school, the teams engaged in research which included systematic observation of reading, structured interviews with various school staff members, and collection of background data on the entire staff together with demographic and home background data on students. The researchers divided the data gathered from these instruments into the following 11 categories: leadership; coordination of reading activities; extra reading personnel; school atmosphere; individualization; evaluation of pupil progress; high expectations; strong emphasis on reading; use of phonics; staff training and experience; and quality of teaching. Once again, a controlled study focused on process variables within the school setting.

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[4]More than half of the students were reading at or above the acceptable competency level for their grades on the Pupil Evaluation Program Tests, and 25 percent were reading at or above grade level on national norms on the Metropolitan Achievement Tests.

[5]Only 16 percent of these students were reading at or above the state-defined competency level for their years on the Pupil Evaluation Program Tests, and a mere 10 percent were reading at or above grade level.

As a result of the complexity of their design and analysis, ERC researchers arrived at conclusions which were stratified* into several categories. All categories rated low on coordination and individualization, and as a result these variables were eliminated. Overall, the successful schools placed uniformly strong stress on reading and provided high quality teaching.

The general findings of the Massachusetts researchers supported the hypothesis that emphasis on reading, quality of teaching, atmosphere, staff training and experience, leadership, expectation, use of additional reading personnel, and evaluation are "good candidates to be the determining factors of success." The study also concluded, however, "that ... there is discernible no single pattern of school factors that determines excellence." Therefore, instead of imitating a model of excellence, the study recommended "that schools focus on the process by which they can achieve excellence, each school thereby establishing its own brand or pattern of factors." The implication that schools could overcome background factors, as was shcwn in the New York study, was confirmed in the Massachusetts study.

A subsequent study by economists at the Federal Reserve Bank of Philadelphia reverted to the earlier style of using an economic model with neither outcome predictions nor comparison schools included in the design. Their major finding (Summers and Wolfe, 1975) was that:

> School inputs (such as class size and teacher experience) do help students grow in educational achievement and can compensate for the disadvantages of poverty, race, and low ability. Moreover, many inputs have a larger impact on some students' performance than others. Small classes, for example, help low achievers, but are of no special benefit to average achievers. Further, some characteristics of staff inputs--extra educational credits of teachers, for example--do not appear to boost learning.

Although the Philadelphia study provided several interesting findings, it primarily reemphasized an economic mode of analysis in which status variables and regression analysis were used.

The Michigan State Department of Education (1974) contracted for a high-low matched study in which 25 high-achieving and 23 low-achieving compensatory education sites in Michigan were examined. The research was an effort to discover educational practices which can effect changes in student behavior and the costs associated with those practices. Variable groupings included in the study were staff variables; organization and management of the overall program; organization and management of classroom reading activities; method of instruction; staff development; student characteristics; school and school district characteristics; utilization of staff time; and participants. The general conclusion of the researchers was that definite program characteristics which are controllable by school district staff can make a difference in determining school achievement (Michigan Department of Education, 1975). Among these controllable characteristics are:

- The classroom monitoring role of the principal and the manner in which the principal allocates his time and delegates decision making in certain areas to the classroom teachers

- The role of teachers, the degree of decision making delegated to them, and the amount of time the teachers allocate to instructional management activities, including diagnosis

- The amount of time allocated by the director and teachers of compensatory education to planning and preservice training (pp. 2-3)

The Michigan study's primary contributions to school effectiveness research were the determination of a set of factors systematically related to student reading achievement and the finding that, within limits, more financial resources, when properly used, yield increased student achievement.

This brief chronological survey of research designs used in school effectiveness studies suggests the importance of continued research and development of methods which can accurately isolate specifically educational factors from environmental ones that affect student achievement. This study, then, is a continuation of this effort in educational research.

B. Categorical Breakdown of Specific Variables of Interest

This section of our review of earlier studies is focused on the major fields of interest, which are divided into three categories. These three categories are shaped, to some extent, by the conclusions reached in Chapter IV. That is, certain variables have been placed in three categories to facilitate the understanding of the findings: staff characteristics, measures of student-staff interactions, and instructional and organizational processes.

1. Staff Characteristics

The primary categories of school personnel are the principals and teachers; aides and volunteers hold ancillary positions. In the past, principals have frequently been studied as a group. In the 1920s a number of researchers began to focus first on ratings to determine success (Cranor, 1921; Spenser, 1922; Rich, 1922; Touten, 1923) and later on lists identifying principals' duties (Briggs, 1943; D. L. Lewis, 1938; Kelly, 1947; Elsbree, 1951; Romine, 1950). Leadership traits which could easily be linked to necessary administrative behavior were also assessed in subsequent studies (Reavis, 1940; National Education Association, 1948; Shannon, 1948; Smith and Sprowles, 1954). In the 1950s increasingly sophisticated studies emphasized the importance of the quality of performance (Ramseyer, 1955; New Jersey Education Association, 1969). Even in 1971, however, Kiesling could conclude that, despite earlier research, educators remained "abysmally ignorant of the traits of a good school manager."

In 1966 Levine's research emphasized the necessity for "vigorous and highly skilled" administrators to promote and to maintain adequate education levels in low-income schools. Furthermore, he stressed the necessity for communication between principals and faculty on the importance of "structured and constant learning environments." Similar findings that tended to link certain characteristics of administrators to student achievement were published

by Weber in 1971. After studying four exemplary schools, he determined that "strong leadership" involving initiation and direction for the reading program were strong factors in student success.

Yet even in 1973 only limited assessments had been made of administrative qualities that contribute to a school's success. After conducting a comprehensive review of research into school resources, for example, Heim (1972) found that only four studies had related student achievement to administrative characteristics. All four studies had dealt with student-administrator ratios, and none had found any correlation between the ratios and student achievement. Thus even these four studies were limited in the implications one could draw as to the relationship between administration and student achievement.

Teachers as well as principals have been a frequently studied group. Although Coleman concluded in 1966 that teacher characteristics accounted for more variation in cognitive areas than did any other school variables, other studies associated the effects of teachers with those of principals. Levine's 1966 study stressed communication between principals and teachers, and Lutz and Evans' 1968 work emphasized the importance of bridging "the chasm that separates the perceptions of teachers and principals."

The perception of the principal-teacher relationship and the satisfaction it can yield may also be important for achievement outcomes. Charters (1963) noted that the assumption of a relationship between teacher satisfaction and "the teaching-learning process" was "in want of conceptual specifications." Lortie (1973) recommended a closer look at the repetitive demands that work makes upon teachers and their assessment of these demands as an indication of their attitudes and subsequent actions. Zander's (1974) interests were related more to group processes. He emphasized that the performance of a group such as teachers could be improved by creating conditions that would nourish their desire for success and reward them for their accomplishments.

These researchers laid the groundwork for the study of personnel in the School Effectiveness Study. Although individual studies have shown the importance of isolated characteristics of teachers and principals, the School Effectiveness Study tested for verification of these characteristics and their interdependencies.

2. Measures of Contact Between Students and Staff

Various researchers have asserted that the relationship between instructional time and learning is a strong, positive one. Carroll (1963) devised a model for school learning and stressed the importance of students being allowed sufficient time to master various educational skills. Harris and Serwer (1966) analyzed reading approaches for disadvantaged New York City schoolchildren and concluded that the amount of time per day spent in reading activities was a significant factor in reading achievement. However, Husen (1972) reviewed a number of international studies and concluded that no strictly linear relationship had been found which could correlate exposure to teaching with student achievement. But in 1974 Wiley and Harnischfeger pointed out that the research methods which Husen used in drawing his conclusions were not designed with this type of study in mind. They also reported in their own research that the number of hours of instruction per year was related to gains in reading, verbal skills, and mathematics. Their conclusion was that amount of instructional time is "a highly relevant factor" for achievement.

In addition, Stallings' evaluation of the Follow-Through program (1975) revealed a direct positive relationship between the amount of time a child spends in reading activities with an adult and the child's achievement scores. Furthermore, Stallings found that the amount of time spent on social studies was strongly related to reading achievement. Like Stallings, Bloom (1974) provided strong reinforcement for the notion of a positive relationship between time and learning. After reviewing several studies conducted at the University of Chicago, he concluded that the amount of time spent on learning is "highly predictive" of student achievement. On the basis of these findings, he stressed the attractiveness of time as a variable, and he encouraged additional study.

In spite of all the positive research on time, additional research needs to be conducted. Husen (1972) has emphasized some of the thorny problems in assessing the importance of time--among them are the necessity of accounting for parental education, rural-urban residence, and teacher competency as possible interacting variables. The School Effectiveness Study is designed to disregard out-of-school variables; it analyzes the within-category interactions. However, the interplay of time utilization, teacher competency, and actual classroom activity need further research.

3. Instructional and Organizational Characteristics

Research has often indicated that instructional processes and organizational characteristics that accompany them can affect student achievement. Two of the major issues in this category include classroom grouping practices and instructional styles.

Assessing research on instructional styles and organizational processes may have been the most difficult of the areas reviewed. Although thousands of studies have been conducted, relatively little is known about desirable teacher characteristics or the influence of teachers on student achievement. Although many rating scales have been devised, they seldom correlate* strongly with student achievement (Harris, 1969). Rosenshine and Furst (1971) reviewed a number of experimental and correlational studies of instructional style and listed five variables which are strongly supported by that research as related to achievement outcomes. They include clarity of presentation, variability of activities, teacher enthusiasm, degree of task- or achievement-orientation or businesslike attitude, and student opportunity. Additional confusion in this area is created in that, even among themselves, educators cannot agree on whether personality characteristics or instructional style is more important for student achievement. Although many educators categorize instructional style as more important, others contend that personality characteristics such as ability to motivate students are more important than the manner of imparting information.

Research performed in the same year by Gordon (1975) found similar styles to be important when he conducted a nationwide study of ESEA,Title I projects. He found that a tightly structured program--including frequent and immediate feedback combined with a tutorial relationship, individual pacing, and somewhat individualized programming--is positively related to achievement by low socioeconomic status students.

A large number of studies have been conducted on classroom grouping. The best review of the studies was conducted by Thelen (1967), who reported that homogeneous grouping (for example, by intelligence or performance) does not differ from heterogeneous grouping in its effects on achievement. He indicated that the more important variable may be teaching method. For example, a teacher is unlikely to increase achievement significantly by using the same methods, assignments, and challenges regardless of the type of group. More achievement is to be expected in classes or groups where the teacher fully understands and responds to the specific needs of that class or group.

At least three other studies (Berliner, 1967; Soar, 1973; and Stallings, 1975) have also examined grouping strategies as part of larger studies on instruction and organizational styles. In their classroom studies (of beginning teachers and Follow-Through educational models, respectively), they determined that the presence or absence of a supervising adult was more important than either the size or number of groups within a classroom.

The School Effectiveness Study examines both classroom grouping and pacing and instructional styles to expand on the ideas propounded by earlier researchers. The intent is to clarify the findings of earlier studies.

C. Summary of the Chapter

The review of previous studies discussed in this chapter lays the basic groundwork for development of the present School Effectiveness Study methodology. The cost-effectiveness studies of earlier years evolved into a more sophisticated form of matching schools to remove socioeconomic effects from school variables under study and to investigate the variables which distinguish high-achieving from low-achieving schools. Simultaneously, the collection of data has progressed from amassing status variable information such as the number of years of teachers' experience and type of college or university attended to the initial collection of process or interaction variables, including assessment of classroom organization and teaching quality. Recently, more investigation has been conducted in which on-site observation is made. As a consequence, more information regarding process variables has begun to emerge in these later studies.

A number of other patterns have become evident from past studies. Important teacher variables range from verbal ability, salary, and type of graduate institution to staff development, attitudes, and use of time. Staff characteristics have also been emphasized in the great number of studies which have charted administrator attributes and activities as influencing achievement. Class size, ability grouping, and expenditures have also been frequently mentioned as important independent variables. The current need, however, is for a coordinated look at schools and a study of the relationship of the variables identified in that analysis.

The School Effectiveness Study advances research within the field by means of additional development of the procedures for school selection to include those at all socioeconomic levels. The study focuses on and refines further the specific categories of personnel characteristics and behavior, measures of contact between students and staff, and instructional and organizational processes which many of these earlier studies hypothesized as effective.

Chapter III
Design and Methodology

Design and methodology are the foundations of any research study. The intent of this chapter is to describe the research methods used in the School Effectiveness Study in sufficient detail so that the methods can be assessed and used by other researchers. What follows, then, is a series of subheadings outlining both the basic design and methodology used. In general the discussion under each of these subheadings is relatively more technical than is the remainder of the report.

A. Achievement Scores and School Selection

Twenty-one pairs of California elementary schools were selected for study. Of approximately 5,500 elementary schools in California, about 2,000 were eliminated from further consideration because sufficient information on those schools was not contained in the State Department of Education's elementary school computer information system. The following data were available for the remaining 3,500 schools:

1. Achievement scores on the Comprehensive Tests of Basic Skills:

   Scores on the Comprehensive Tests of Basic Skills were the scores achieved on tests administered to sixth graders in both 1972-73 and 1973-74 as part of the California Assessment Program. The scores were subsequently reported to the State Department of Education. Only the scores from schools with at least 16 sixth-grade students were used. As a result, scores from very small schools were not considered.

2. School size:

   The school size was determined by the number of sixth graders administered the Comprehensive Tests of Basic Skills in 1973.

3. Socioeconomic status of the students:

   From the pupil information section of the state Entry Level Test, a school index was determined from the average father's occupation.

4. Percentage of minority enrollments:

   Percentages for minority categories--American Indian, black, Asian American, Spanish-surnamed American, and other--were obtained from the state Entry Level Test.

5. School locality:

The elementary school questionnaire contained a list of nine categories used by principals to describe their schools. These nine descriptions were then condensed into the following three categories: city, suburban, and rural.

The combination of these five variables together with scores on the sixth grade Comprehensive Tests of Basic Skills were used as the selection variables.

The component scores from the Comprehensive Tests of Basic Skills were then weighted and used to form criterion variable T for each school in the following proportions:

T = 8 (reading) + 4 (language) + 2 (spelling) + 7 (mathematics)

The regression equation included certain predictor variables: (1) an index of socioeconomic status; (2) the percentage enrollment for each of five racial-ethnic categories (American Indian, black, Asian American, Spanish-surnamed American, and other); (3) an index of bilingualism; and (4) the number of sixth graders taking the sixth grade achievement test. A preliminary analysis of achievement and predictor variables led to creation of the following strata: (1) three levels of urbanism (city, suburb, rural); (2) three levels of socioeconomic status (high, medium, low); (3) three levels of total percentage minority enrollment (high, medium, low); and (4) three levels of school size as measured by the number of sixth graders taking the tests (high, medium, low).

The three levels of urbanism contained unequal numbers of schools. Each of the other factors, however, was divided into levels containing approximately the same number of schools. Considered together, the stratification provided 81 (3x3x3x3) disjoint classifications of schools.

Regression equations were run separately for 1972-73 and 1973-74. These equations were separately generated for each of the two years to ensure consistency of performance of the schools identified for study.

In each year one regression equation was calculated for each of nine classifications created by the cross configuration of the three levels of urbanism (city, suburban, rural) and the three levels of total percentage minority enrollment (high, medium, low). Preliminary analysis revealed both a curvilinear relationship between achievement and total percentage minority enrollment and different structural relations between criterion and predictors in the three urbanism settings. In general, student achievement was positively related to socioeconomic status and negatively related to both bilingualism and total percentage minority enrollment. Achievement tended to be higher in suburban schools than in city schools and higher in city schools than in rural schools.

Although much variation in achievement existed within the suburban and city schools, the rural schools were relatively more homogeneous in achievement. School size bore only a weak and inconsistent relationship to achievement; in the analysis, it served primarily as a weight for residuals.*

Residuals from predicted scores were used to create separate pools of very high-achieving and very low-achieving schools for each of the nine regression equations for both years. Paired schools were substantially similar for each of their predictor variables but extremely dissimilar in their student achievement. A low score on one predictor variable was not used to compensate for a high score on another predictor variable.

Schools were selected in such a manner that pairs of schools were drawn from 19 of the 81 possible classifications of schools. The selection of the 19 classifications was based on a compromise between representing the "average school" and representing the broad variety of schools in California. The number of pairs of schools in each level of the background factors is presented in Table III-1.

Although the original design had called for 24 pairs of schools, only 21 pairs were studied. One pair was not included because one of the schools in the pair had been closed; a second pair, because an error occurred in selection; and a third pair, because a principal declined to participate.

Scores on the Comprehensive Tests of Basic Skills subtests were used as criteria to select schools for inclusion in the School Effectiveness Study. The 42 schools selected covered the full range of values for each of the selection variables--school size; type of location; ethnic make-up; and parental income. However, while the two schools within each pair were identical for each of the selection variables, they were divergent in their achievement scores on the Comprehensive Tests of Basic Skills subtests.

TABLE III-1

Number of Schools, by Factor and Level

Factor	Number of pairs of schools in each level		
	Low (small)	Medium (mid)	High (large)
SES (father's occupation)	9	6	6
Urbanism[a]	4	7	10
Minority representation	7	6	8
Size of school	6	7	8

[a]For this variable only, low = rural; medium = suburb; high = city.

B. Corroboration of Achievement Scores Used for School Selection

Although standardized, norm-referenced achievement tests yield a sound assessment of achievement, they do so only within the limited dimensions of any norm-referenced test. At the outset no other achievement criteria were used; hence the school's characteristics reflect only rather narrow achievement criteria. Furthermore, principals had previously been informed by the California Assessment Program of their school's sixth grade achievement scores. Thus the principals knew whether their obtained scores were above, at, or below the score that would be predicted for them on the basis of their school's background (demographic) characteristics. This information may well have influenced the principals' responses to several questions in this study. To the extent that principals passed this information on to teachers, the teachers' responses may also have been influenced. Consequently, a legitimate concern existed as to whether and how much principals might have been influenced by the knowledge of their school's actual achievement test results while they assessed the qualities of their sixth grade achievement tests. For example, principals at higher-achieving schools did rate the test as a more accurate assessment of their students' academic skills than did principals of lower-achieving schools.

Principals were also asked to describe the preparation that preceded the sixth grade testing. In general, the descriptions indicated that preparation for the test tended to be better at higher-achieving schools than at lower-achieving schools. Of the 11 items used to question principals about preparation, four items showed statistically significant differences between higher- and lower-achieving schools. At higher-achieving schools certain tasks were generally carried out more efficiently than they were at lower-achieving schools: (1) administrative instructions supplied by the state were followed precisely; (2) teachers were familiarized with the test before it was administered; (3) time limits were closely adhered to; and (4) distractions and interruptions were kept to a minimum.

To corroborate distinguishing higher- and lower-achieving schools on the basis of the achievement test scores, researchers made a number of checks. The first check was a series of observations conducted at the sampled schools. Observation teams were used consisting of four persons--one employee from the State Department of Education and three administrators from school districts and offices of county superintendents of schools. The teams met with the principal, several teachers, and other school personnel in each of the schools sampled to gather information and complete six questionnaires and interview guides.

The observers were not told which schools were the higher-achieving ones and which were the lower-achieving ones, nor were they told which schools were paired. At the end of their two-day visit, observers were asked to assess whether the school they were visiting was higher-achieving or lower-achieving and their degree of confidence in that decision. Their judgments are displayed in Table III-2.

A substantial number (73 percent) of the observers were able to judge correctly, but fewer than half of the observers (45 percent) were both correct and highly confident in their opinions. Although the estimates were significantly above chance, total agreement on the student achievement-based classification of schools as higher-achieving or lower-achieving was lacking. The school selection procedure was additionally strengthened by an analysis which clearly showed that the incorrect judgments were not the result of bias. Rather, they were spread randomly throughout the entire distribution of schools and observers.

Besides these observations, another check was conducted to ensure that achievement scores were valid criteria for selecting schools in which to measure school effectiveness. This check, which was made by the use of 20 photographs taken at each school, should be interpreted with some caution because the photograph formats lacked a high degree of consistency. In the analysis phase, photographs of five pairs of schools were displayed on poster boards. Forty-one professional educators were asked to view the photographs and indicate which school in each pair was lower-achieving. Fifty-one percent of the responses were correct. In addition to the educators, 150 students from the sixth grade of a typical elementary school viewed the same photographs and were asked to indicate the school in each pair which they would prefer to attend. Sixty-nine percent of their choices were higher-achieving schools. The educators' responses were not significantly above chance, but the students' choices were significantly above chance.

On the basis of an analysis of several indicators of quality schooling, it was concluded that the test score criterion was, in fact, appropriate for determining schools which represented prototypes of successful or unsuccessful schools. For example, in terms of school ratings, observers were able to judge the achievement characteristic of schools on the basis of their observations to a degree that was significantly above chance. In a more limited way, the use of photographs also tended to corroborate the selection of higher- and lower-achieving schools on the basis of test scores. In short, the high degree

TABLE III-2

Observers' Judgments of Achievement Status, by Confidence Level

Confidence level	Judgments	
	Percent correct	Percent incorrect
Low	28	18
High	45	9
Total	73	27

of correlation between the independent and dependent variables adds weight to the use of achievement scores for categorizing schools.

C. Instrumentation

With our selection of schools accomplished, we then designed eight instruments to be used in analyzing the effectiveness of the sample schools. The eight instruments used in this study are as follows:

- Principal questionnaire: Describes certain school characteristics; primarily demographic in nature (This instrument is not described further in this section.)
- Teacher questionnaire: Describes teacher attributes, such as age, training, and teaching style (This instrument is not described further in this section.)
- Principal interview: Describes principal's perceptions of school practices and administrative structure
- Teacher interview: Describes teacher's perceptions of school practices, policies, and professional satisfaction
- Classroom observations (based on Madeline Hunter's work): Describes classroom interaction and teaching style
- Photographs of school environment: Records descriptive information regarding pictures taken on site
- Fiscal data: Records fiscal and resources information
- Judgment: Records on-site observer's opinion of whether the school was higher-achieving or lower-achieving and the factors leading to this conclusion

1. Principal and Teacher Interviews

In the fall of 1974, one of several four-person teams visited each school being studied, observing classes and interviewing principals, teachers, and other school personnel to collect information which might explain school effectiveness. These teams paid particular attention to the areas of administrative and instructional practices, fiscal policies, perceptions of influence on decision making, and general school environment. The visitation teams, whose members were drawn from the State Department of Education, school districts, and offices of county superintendents of schools, were informed of neither the achievement level of various schools nor their pairing.

Before visiting the schools, each team member participated in a two-day training conference on use of the instruments. The visitation teams subsequently recorded the responses of 350 teachers, 42 principals, and other school personnel. Observers interviewed the school principal and as many as ten teachers at each school during the two-day school visitation period. The only criterion for interviewing either a principal or a teacher was that the

principal or teacher had been a part of the educational process that had led to the school achievement scores of 1972-73 and 1973-74. In several instances fewer than ten teachers were interviewed because teacher turnover had been great or the school had a small number of teachers.

2. Classroom Observations

Each observer received a separate copy of a classroom observation record for each teacher interviewed. During either the reading or mathematics periods, the observer was to monitor the teacher's instructional style and rate both the teacher and his or her method on each of 17 scales. Then an overall rating was to be made within the same range. To measure interobserver agreement, team leaders made a second classroom observation of a teacher who had been observed by another team member. Fifty-nine teachers were observed and rated on 12 items. Because the two observations did not occur at the same time, they do not represent two observations of exactly the same teacher behaviors or classroom configurations. The relatively strong correlation between the two observation measures, therefore, is a composite of both interobserver consistency and the consistency of teacher quality and classroom interaction patterns over a period of time.

3. Photographs of School Environment

Twenty photographs were taken at each school. The plan called for the examination of slides by a jury of "experts" who would attempt to detect attributes in the photographs which differentiate between the two schools of a pair. Unfortunately, little consistency occurred in the photographs taken; and the photographers were not equally skilled in taking candid, unobtrusive photographs. Although the photos proved helpful in corroborating test scores as criteria for school selection, they proved to be of limited value in determining the features of effective schools.

4. Fiscal Data

One member of each visitation team was an expert in the fiscal management of school districts. In their attempts to collect fiscal data at the school-site level from school district offices and school records, the fiscal observers found two major problems in several schools. First, in many instances, school district and school-site financial data were not available. (The original research design had called for a five-year longitudinal study of school-site expenditures.) Secondly, although districts follow the California School Accounting Manual (Sacramento: California State Department of Education, 1976) at the district level, many different procedures can be followed for fiscal accounting at the school level. For example, district maintenance expenses are rarely available as school-site costs of maintenance. Because of the lack of consistency in recordkeeping practices at the school level, several variables have been excluded from consideration as potential cost discriminators. Only seven of 33 measurements were collectible from only 12 of the 21 pairs of schools. Consequently, the analysis of fiscal data, severely limited, was eliminated.

5. Judgment

At the conclusion of the two-day visitation period, each observer indicated whether the school just observed was in the higher- or lower-achieving group. The observer was to use any clues received in the course of interviews and observations. These clues and any information which the observer used in arriving at a decision were recorded.

6. Analysis

By means of a variety of techniques, the data contained in several instruments were analyzed. Tables were displayed to facilitate comparison of higher-achieving and lower-achieving schools to trace each comparison across background factors. All scaled items were analyzed by the analysis of variance* method; all nonscaled items were analyzed by the chi-square method. Related items were analyzed in either of two aggregate forms: some variables were combined to create new compound variables; others, more loosely associated, were combined in vectors for multivariate analysis of variance.

Items taken from the teacher questionnaire, teacher interview, and classroom observation instruments received multiple responses in each school. These items were analyzed in both a univariate and multivariate analysis of variance, and planned comparisons were used throughout. The layout of the design was two levels of achievement by three levels of SES by three levels of urbanism by three levels of percentage minority. Items on the principal questionnaire and principal interview instruments had single responses in each school. These items were analyzed by means of matched pair t-tests and chi-square contingency tables. To control the overall experimental error rate, the researchers conducted hypothesis testing at the level of $\alpha = .05$ per family of hypotheses.

D. Summary of the Chapter

The description of the research design, methodology, instruments, and analysis is intended for the use of researchers weighing the merits of the study while pursuing the study of school effectiveness. The general design and sample selection procedures of the study are particularly strong. By the use of the large pool of data available through the California Assessment Program, careful selection has been made of a set of schools in which the match of background factors between higher- and lower-achieving schools within a pair is very close and the entire range of schools in California is represented.

Another distinct advantage of this study is its use of on-site visitation and observation in addition to more standard data collection methods. As a supplement to the information provided in Chapter III and Chapter IV, a set of tables displaying the various analyses is presented as Appendix A. Additional information in any of these areas is available on request.

Chapter IV
Findings and Discussion

The findings and discussion contained in this chapter are based on information obtained in the first year (1974-75) of a two-year study of school effectiveness in California. The primary findings of the School Effectiveness Study fall into four major areas:

- Staff characteristics
- Measures of contact between students and staff
- Instructional and organizational processes
- Miscellaneous findings

For a clear understanding and use of the findings as they are presented in this chapter, certain precautions are recommended. The first is that, because additional research will be conducted in the areas studied, the findings ought to be viewed as preliminary. Secondly, the findings contain inferences drawn from natural variation among schools rather than the planned variation of a controlled experiment. And thirdly, because the inferences are drawn from natural variation, the activities and personnel observed in the lower-achieving schools may not be responsible for the low scores. Rather, the observed activities and personnel may represent changes introduced to overcome the initially low scores. This second possibility is an alternative hypothesis which becomes more plausible because lower-achieving schools have reported an increased number of personnel and curricular changes in recent years. However, the hypothesis becomes less plausible in view of the somewhat lower current achievement scores of the lower-achieving schools. The three recommended precautions should be seriously considered before any conclusions affecting policy are drawn from this study.

The sample schools were chosen very carefully, and the data were collected from systematic observation and measurement of practices and characteristics of the schools. The researchers interfered little with the schools' normal routines. Consequently, the findings and the methods used to obtain them will be useful in further research into school effectiveness.

Certain other clarifications also need to be made. For example, when the report refers to higher-achieving schools as having a characteristic to a greater degree, two inferences are to be drawn: (1) that the comparison group is the set of lower-achieving schools; and (2) that the comparative phrase invariably means "to a degree that is statistically significant." In addition, these differences are the basis of specific statistical tests for the various items described in Chapter III. When, for example, principals at higher-achieving schools report more experience, what is meant is that (1) the principals report more experience than do principals at lower-achieving schools; and that (2) the experience differential is statistically significant and could not have occurred by chance in more than five out of 100 cases.

The basic comparison throughout the study, then, is between higher- and lower-achieving schools, and the basis of this comparison is a statistically significant difference. What follows is a series of discussions of the findings under the four main areas of staff characteristics, contact between students and staff, instructional and organizational processes, and miscellaneous findings.

A. Staff Characteristics

In general, in higher-achieving schools principals and teachers agreed more frequently on the locus of influence within the school as well as on ratings of several criteria of effectiveness and personal job satisfaction. A comparison of teachers' and principals' responses showed more agreement between principals and teachers about the locus of influence over a variety of school-level decisions at higher-achieving schools. Overall, both principals and teachers at higher-achieving schools gave one another higher ratings on several criteria of effectiveness and reported a higher level of personal job satisfaction than did principals at lower-achieving schools.

1. Principals

Because principals are the highest administrators at the school level, they appear to be an appropriate starting point for analyzing staff characteristics. In this study principals at higher-achieving schools reported having much more experience as principals at their schools (mean 8.1 and 2.4 years, respectively) and being generally more satisfied with their position as principals. The principals in higher-achieving schools were also paid slightly higher salaries than were principals at lower-achieving schools, but the higher salaries might be explained by their longer tenure at the schools. No differences in principals' years of experience at their schools appeared across levels of socioeconomic status, percentage of minority enrollment, or urbanism. Principals of higher- and lower-achieving schools did not differ significantly in median age (forty-nine) or highest academic degree (master's degree).

Principals at higher-achieving schools were assessed by their teachers as having more influence over decisions affecting curriculum development and the hiring of teachers and paid aides. Teachers at higher-achieving schools rated their principals higher both on general performance standards and on specific standards of helpfulness--supporting new ideas and projects, backing up teachers, enhancing parent-community relations, enforcing discipline, developing instructional leadership, and acquiring and distributing materials.

2. Teachers

Status characteristics of teachers also differed between higher- and lower-achieving schools, although often not to a statistically significant degree. More female teachers than male teachers were employed in all schools. Male teachers comprised 11 percent of the faculty in higher-achievement schools and 22 percent of the faculty in lower-achievement schools. This two-to-one ratio held consistently for the three levels of SES and for the three levels of percentage minority enrollment.

In comparison with teachers at lower-achieving schools, teachers at higher-achieving schools reported being slightly older (median age forty-two versus thirty-nine), having more years of teaching experience (median eleven versus eight years), and having obtained more college credits since beginning teaching, although no significant difference was reported in number of college credits in reading courses. As with principals, teachers at higher-achieving schools were paid slightly higher salaries; but the difference might well be explained by their longer tenure in teaching at the schools and their greater number of college credits.

Teachers in low socioeconomic status (SES) schools reported being slightly older than teachers in either high-SES or mid-SES schools. Teachers at schools with a high percentage of minority enrollment reported a median age of forty-two in comparison with teachers at schools with mid- and low-percentage minority enrollment, who reported median ages of thirty-eight and forty, respectively.

Teachers at higher-achieving schools believed that their faculty as a whole had less influence on school-level decisions affecting teacher hiring and administrative methods of teacher evaluation. It appeared that teachers at higher-achieving schools, in general, perceived the influence of their faculty as a whole to be less than the faculty influence reported by lower-achieving schools.

No significant differences appeared between higher- and lower-achieving schools on teachers' responses to items regarding their willingness to be a leader or share ideas and teaching tasks with others. Teachers at higher-achieving schools, however, reported being more satisfied with various aspects of school than did teachers at lower-achieving schools, particularly as to their work relationships with the principal and other teachers, teacher evaluation, and their roles as teachers.

3. Counselors and Specialists

More than half of the schools studied reported having counselors on the staff. Although among low socioeconomic status (SES) schools, the lower-achieving schools had more counselors; among high-SES schools, the higher-achieving schools had more counselors. In general, though, no relationship was discernible between achievement and the employment of a counselor.

In addition to regular classroom teachers, other certificated personnel teach students. Because they have special training and licenses or teach a specially identified population of students, they are classified as specialist teachers. One difference did emerge quite clearly in this analysis. Unlike the reading specialists in lower-achieving schools, specialists in higher-achieving schools spent relatively more time teaching students directly and relatively less time instructing teachers in specialist techniques.

4. Paid Aides and Volunteers

In total, 640 paid aides and adult volunteers were reported in the study. No appreciable difference appeared between higher- and lower-achieving schools as to the number of such persons they reported (an average of 1.9 and 1.8,

respectively, per teacher). The number of paid aides and adult volunteers (the distinction between the two categories is based on renumeration and training) is expressed in Table IV-1 on a per teacher basis for high, middle, and low SES and for higher- and lower-achieving schools. The data in Table IV-1 are displayed to illustrate the number of paid aides and volunteers by a common standard--number of aides and volunteers per teacher. It is not implied that the numbers represent their actual assignment at the school level.

Higher-achieving schools had slightly fewer paid aides than did lower-achieving schools. On the average, low socioeconomic status schools had twice as many paid aides per teacher as did mid-SES and high-SES schools.

As to the distribution of adult volunteers, higher-achieving schools had slightly more of them than did lower-achieving schools, and both high-SES and low-SES schools had twice as many adult volunteers as did mid-SES schools. In addition, within the group of low-SES schools, the higher-achieving schools did have more adult volunteers (1.4 per teacher) than did the lower-achieving schools (0.6 per teacher). In contrast, within the group of high-SES schools, higher-achieving schools had fewer adult volunteers (0.8 per teacher) than did lower-achieving schools (1.4 per teacher).

Teachers were asked to indicate how paid aides and adult volunteers were used in terms of several types of functions they might perform. The teachers in higher-achieving schools reported using aides significantly more for watching children on the playground, handling classroom paperwork such as keeping attendance and recording student work, and helping to maintain classroom discipline. They reported about the same use of aides in teaching academic subjects, tutoring individual students, and teaching small groups.

5. District Administration

Teachers from higher-achieving schools reported that personnel in their district had more influence over curriculum and teacher hiring. In appraising

TABLE IV-1

Number of Paid Aides and Adult Volunteers per Teacher
by Achievement Status and Socioeconomic Status

Achievement status	Type of personnel	Number of personnel by socioeconomic status			Weighted average
		Low	Middle	High	
Higher-achieving schools	Aides	1.5	0.5	0.7	1.0
	Volunteers	1.4	0.6	0.8	1.0
	Total	2.9	1.1	1.5	1.9
Lower-achieving schools	Aides	1.3	0.7	0.7	1.0
	Volunteers	0.6	0.5	1.4	0.8
	Total	1.9	1.2	2.1	1.8

the performance of the districts' central administration, teachers from higher-achieving schools rated the administration higher in instructional leadership and allocation of materials and resources, equal in support for teaching staff and attendance and discipline of students, and lower in effecting group involvement in school decision making.

6. Agreement Between Principals and Teachers

On the one hand the principals from lower-achieving schools reported greater influence over teacher hiring than did principals from higher-achieving schools. But on the other hand, the teachers from lower-achieving schools reported that their principals had less influence over teacher hiring. Similarly, teachers from lower-achieving schools reported themselves as having more influence over teacher hiring than did teachers from higher-achieving schools; but the principals from lower-achieving schools did not support that contention. In comparison with teachers from higher-achieving schools, teachers from lower-achieving schools generally reported themselves and their teachers' organizations as having more influence over decisions concerning hiring, assignment, and evaluation of teachers. Teachers at higher-achieving schools rated their principals higher on each of the six criteria they were asked to use. These teachers also responded more positively regarding their relationships with their principals.

7. Faculty Meetings and Inservice Training

Principals from lower-achieving schools reported having more faculty meetings per month than did principals from higher-achieving schools. The frequency of faculty meetings also appeared to be related to the background characteristics of students, with low-SES schools having more faculty meetings than did high-SES schools.

Principals from higher-achieving schools reported more district encouragement of inservice training in the form of either payment of teacher expenses for inservice training or an award of credit on salary schedules for that participation. The degree of district encouragement appeared to be related to school achievement and level of SES; a relatively greater degree of encouragement was reported in the higher-achieving schools among low-SES schools and in the lower-achieving schools among high-SES schools.

Nearly all schools reported that special training was provided to help teachers learn to use some reading materials. In comparison with principals at lower-achieving schools, the principals at higher-achieving schools reported that less special training was provided for the mathematics materials (57 percent versus 92 percent). Differences were also reported regarding both the trainer and the format employed in the training; higher-achieving schools reported the use of relatively more district personnel and fewer outside consultants. They also reported having relatively more short-term workshops and fewer ongoing inservice training and special presentations.

B. Measures of Contact Between Students and Staff

1. Use of Class Time

For the initial assessment of measures of contact, only estimated time spent in class rather than observed contact time has been measured. The estimated time spent in class was obtained by asking teachers to indicate the amount of class time spent weekly on typical elementary subjects. Observed contact time would have required extended observation and analysis of specific teaching activities.

Teachers' responses are shown in Table IV-2. In comparison with teachers at lower-achieving schools, teachers in higher-achieving schools reported that they spent relatively less total time in classroom instruction; more time on social studies; less time on mathematics and physical education/health; and about the same amount of time on reading/language development and science. Absolute differences between higher- and lower-achieving schools varied only slightly between social studies (.3 hours' difference) and reading (.1 hours' difference); yet a statistically significant* difference occurred between groups in the former category but not in the latter category.

TABLE IV-2

Class Hours per Week, by Subject Area and Achievement Status

Subject area	Class hours, by achievement status	
	Higher-achieving schools	Lower-achieving schools
Reading/language development	9.5	9.6
Mathematics	4.4	4.8
Science	1.9	2.0
Social studies	3.1	2.8
Physical education/ health	2.2	2.4
Other	3.0	3.1
Total	24.1	24.7

After the results were tabulated, schools were contacted to verify the derived estimates of total time. The school schedules confirmed the total time estimate shown in Table IV-2. The seemingly small hourly differences between higher- and lower-achieving schools were particularly remarkable in that the Education Code does not mandate (or even suggest) appropriate instructional time for any subject except physical education (see Education Code Section 8551). (The Education Code does specify a minimum number of hours and days that classes must be in session each year.) Both the lack of any directive and the aforementioned lack of bias make the findings regarding the length of time of instruction in mathematics and social studies particularly interesting.

The finding that students in lower-achieving schools receive significantly more instruction in mathematics than do those in higher-achieving schools prompted a reexamination of the criterion variable used in classifying schools as higher- and lower-achieving. A suspicion that the particular weighting of component scores used in forming the criterion might have caused a distortion proved to be unfounded; the higher-achieving schools had relatively higher mathematics component scores than did the lower-achieving schools.[1]

2. Summer School Attendance

Another measure of contact between students and staff was summer school attendance. Observers polled several classrooms of students at each school to ascertain this information. The results are displayed in Table IV-3. Although a larger percentage of students from higher-achieving schools indicated that they had attended summer school, the more important variation appeared between socioeconomic levels.

TABLE IV-3

Percentage of Students in Attendance at Summer School by Socioeconomic Status and Achievement Status

Socioeconomic status	Percentage of student attendance by achievement status	
	Lower-achieving schools	Higher-achieving schools
Low	17	39
Medium	36	46
High	36	28
Weighted average	28	38

[1]See Chapter III for information on the achievement criterion variable and the weighting of component scores in the formation of the criterion.

C. Instructional and Organizational Characteristics

1. Instructional Styles

Teacher quality and classroom atmosphere were rated significantly higher by observers in higher-achieving schools. Observers rated teacher quality according to certain characteristics. Included were teaching to an objective at an appropriate level of difficulty; effectively monitoring student progress in lessons and adjusting appropriately; and facilitating the learning process by applying well-established principles of learning, such as motivation, to get students started on their lessons. Also included were recognition of limited attention spans and positive encouragement of good work habits. Operationally, classroom atmosphere was a combination of items on the observation instrument which described student self-reliance and the general tenor of the classroom.

In general, observers perceived students at higher-achieving schools to have more opportunities to decide for themselves about varying their tasks and activities. There were fewer gaps or delays in student classroom activities. Students were perceived to be happier, more engaged in their work, and less disruptive, restless, or bored. Although students in higher-achieving schools showed these traits, the rates of absenteeism in higher-achieving schools did not differ substantially from the rates in lower-achieving schools.

In an attempt to measure the reliability of information obtained from classroom observations, 59 teachers were observed on two different occasions, once by a team member and again by a team leader. The correlation between the observer rating for the total score for 12 items from the classroom observation instrument was 0.65, a moderately strong agreement considering that the observations were made independently and at different times of the day.

2. Group Assignments and Pacing of Instruction

Among the first questions asked about instructional processes were two related questions which dealt with the criteria for forming groups for reading and mathematics instruction and the pacing of students within those groups. In response to the former question, teachers in higher-achieving schools reported placing more emphasis on students' academic performance in both subjects. The results of the latter question, related to pacing, are displayed in Table IV-4.

Although the great majority of teachers reported the use of different pacings and more than one grouping, significant differences were reported between higher- and lower-achieving schools. Teachers in higher-achieving schools divided their classes into several groups working at different paces; teachers at lower-achieving schools more frequently reported individualization of instruction. The reasons for this finding are far from clear; the data are based on what local schools describe as "individualization" combined with some direct observation. The first-year data have not been assessed well enough to determine the extent of actual implementation of individualized instruction.

3. Placement and Evaluation of Students

Principals were asked several questions concerning possible criteria for the placement of students in reading and mathematics classes. The principals in higher-achieving schools indicated that for both reading and mathematics placement, more importance was given to the results of standardized tests and other commercially developed tests and less importance to the results of teacher-made tests, classroom performance, and teacher recommendations. This pattern, which distinguishes principals' reports for higher- and lower-achieving schools, remained fairly consistent for all levels of SES and all levels of minority enrollment.

4. Variation in Materials

Teachers were also asked to indicate how much variation there was in the materials their students used. The results are displayed in Table IV-5.

As with pacing practices, teachers in higher-achieving schools responded that they divided their classes into fewer groups and correspondingly used fewer variations in materials. By contrast, teachers at lower-achieving schools reported far more frequently either that all students used the same materials or that each student used different materials.

TABLE IV-4

Percentage Distribution of Pacing Practices
by Subject and Achievement Status

Pacing practices	Percentage of distribution in mathematics instruction		Percentage of distribution in reading instruction	
	Higher-achieving schools	Lower-achieving schools	Higher-achieving schools	Lower-achieving schools
One group; same pace	9	9	2	4
Two or three groups; different paces	41	25	36	25
Four or more groups; different paces	27	23	41	33
Individualization	22	43	21	38
Other	1	0	0	0

Since differences in pacing might be related to curricular differences, observers questioned principals regarding changes over the past five years in either the mathematics or reading curriculum. Higher-achieving schools reported almost no change, but lower-achieving schools reported a moderate amount of change in both curricula. Either the recommended method of using the new courses of study or lack of familiarity with them may be related to the relationship between lower achievement and greater individualization.

5. Teacher Organizations

In a series of questions, both principals and teachers were asked to assess the degree of influence various parties (district personnel, principal, faculty, parents, and teachers' organizations) involved in local education had on a variety of decisions (curriculum selection, determination of school rules and regulations, teacher hiring, principal and teacher assignment, evaluation of teachers, and paid aide hiring). The rationale for the questions was the belief that the influence of these parties over decision making might be different in higher- and lower-achieving schools. One finding that was consistently reported was statistically significant; that is, both teachers and principals from higher-achieving schools reported teachers' organizations as having less influence over the hiring of teachers than did teachers and principals from lower-achieving schools.

TABLE IV-5

Percentage Distribution of Variation in Materials
by Subject and Achievement Status

Variation in materials	Percentage of distribution in mathematics instruction		Percentage of distribution in reading instruction	
	Higher-achieving schools	Lower-achieving schools	Higher-achieving schools	Lower-achieving schools
One group; same materials	24	35	11	26
Two or three groups; different materials	44	28	43	29
Four or more groups; different materials	27	20	39	28
Individualization	5	17	7	17

D. Miscellaneous

1. Rules and Regulations Governing Student Conduct

Teachers were asked several questions about classroom rules, student conduct, and student discipline; but no significant differences materialized between higher- and lower-achieving schools. No significant differences emerged in classroom rules or student conduct or discipline when levels of SES, percentage of minority enrollment, and urbanism within the higher- and lower-achieving groups were examined. Nor was any difference reported in either the emphasis these schools placed on rules affecting student behavior or in the district policies on student conduct.

However, teachers at higher-achieving schools did rate their principals higher in support in matters of student discipline. Principals' responses indicated that it was easier for a student to be transferred from one teacher to another to resolve a conflict in a higher-achieving school than in a lower-achieving school. Generally, teachers in higher-achieving schools viewed parents as having more influence in the schools, particularly as to decisions on student assignment and school rules and regulations. Parental influence was reported to be only weakly related to high achievement among low-SES schools but strongly related to high achievement among mid-SES and high-SES schools.

2. Multiple Grade Level Classes

Most classrooms were composed of students from a single grade level. Fewer of the classes in higher-achieving schools were composed of students from multiple grade levels than were classes in lower-achieving schools (29 percent and 41 percent, respectively). The multiple grade level class seemed particularly popular in lower-achieving suburban schools (55 percent) and lower-achieving rural schools (50 percent).

3. Accessibility of Materials and Discretion in School Budgets

Accessibility of materials was reported to be greater in higher-achieving schools, and greater teacher satisfaction with available resources was reported in higher-achieving schools than in lower-achieving schools. And although not significantly different, teachers in higher-achieving schools reported more access to resources and sharing of materials. Libraries in higher-achieving schools were reported to be somewhat larger than those in lower-achieving schools (about 6,200 and 5,400 volumes, respectively). Principals' responses indicated that no difference existed between higher- and lower-achieving schools in either the availability of or teacher use of audio-visual equipment and instructional materials.

In comparison with principals in lower-achieving schools, the principals in higher-achieving schools reported having more discretion over school finances. In obtaining instructional materials, they reported having more options in deciding whether to make purchases through central purchasing at the district level or directly from stores through a charging procedure or a pay-and-reimbursement procedure. Nearly twice as many principals at higher-achieving schools reported that decisions could be made at the school site to

convert certificated personnel positions into expenditures in other areas (46 percent versus 25 percent at lower-achieving schools).

4. School Community

Principals were asked to describe the school community on scales of four characteristics: stable to transient, innovative to traditional, supportive to nonsupportive, and active to inactive. Principals from higher-achieving schools consistently described the school community as more stable than did the principals from lower-achieving schools. Among high- and mid-SES schools, the principals from lower-achieving schools described the community as more traditional; but among low-SES schools the principals from higher-achieving schools described the community as more innovative. No discernible difference appeared along the supportive-to-nonsupportive scale. Nor was there a discernible difference along the active-to-inactive scale among low- and mid-SES schools. However, among high-SES schools principals from higher-achieving schools described the school community as more active than did principals from lower-achieving schools.

E. Summary of the Chapter

This chapter contains a summary of the general findings of the School Effectiveness Study in each of four major categories. An attempt has been made to lay out a descriptive framework and discuss that framework's place within the school structure. This discussion has been extended into Chapter V to include a number of conclusions and implications.

Chapter V
Implications of the Study

As presented in Chapter IV, the findings of this study provide valuable information on the four categories of educational variables which have been investigated. Additional analyses of the major factors (including staff characteristics, measures of contact between students and staff, and instructional practices), as well as the minor factors subsumed under each of them, will be undertaken in subsequent research. At the present time, however, a number of practices highlighted by this study should be considered by those who are responsible for local programs and who are interested in improving the quality of educational programs.

Among the strongest findings of the School Effectiveness Study was the importance of teacher perception of administrative support at both the school and school district levels. Teachers in higher-achieving schools consistently reported that principals gave them greater support in instructionally related areas such as provision of adequate materials and support for new ideas and special projects, as well as in those areas less directly connected with the instructional process, including student discipline and maintenance of relations with parents and the community. Equally as important, teachers and principals in higher-achieving schools agreed to a greater extent on the locus of power and decision making. School district administrative support was also viewed as significantly greater by teachers in higher-achieving schools but only in areas such as instructional leadership, allocation of resources, and distribution of materials which are related more directly to the instructional process.

Although information sufficient to establish a direct link between these supportive behaviors and student achievement may still be lacking, two plausible alternative hypotheses can be offered. The significant differences may indicate teacher satisfaction, which improves the learning climate directly; or they may suggest that teachers simply have more time to spend on preparation and direct instructional matters because principals and district administrators are handling subsidiary matters. Whatever the case, principals and administrators who consider high achievement for students to be an important factor in their schools would do well to concentrate on providing both a strongly supportive environment and a well-defined blueprint of the responsibilities and powers of various members of the education community.

A potentially important corollary to supportive behavior is the issue of teacher influence on school decisions. Teachers in higher-achieving schools rated their teaching faculties as significantly <u>less influential</u> in a number of decision making areas than did teachers in lower-achieving schools. This analysis would be remiss if it were to indicate that the correct conclusion to be drawn is that teachers should be discouraged from exercising influence on school decisions. Rather, it can be assumed that this apparent lack of influence is merely a perception of teachers and that it may more likely be related to the satisfaction which they have expressed regarding principal and administrative support for their work. Such a conclusion is more strongly

supported when one looks at the absolute value of higher-achieving and lower-achieving schools on this variable. Then it becomes more clear that, although teachers in higher-achieving schools perceive themselves as significantly less influential than do teachers in lower-achieving schools, in fact neither group perceives itself as very influential. It can also be asserted that the strength of satisfaction with administrators, when substantial, is more important than feelings of personal influence in determining the overall level of satisfaction.

Another set of conclusions relates to instructional practices. The School Effectiveness Study has shown that very different classroom behaviors are exhibited by teachers in higher-achieving schools than by those in lower-achieving schools. From an observation lasting only several minutes, researchers were able to distinguish teachers in the higher-achieving schools from those in lower-achieving schools. Much of that impression was based on a purely subjective evaluation. On the other hand, there is some evidence to suggest that teachers who were rated more highly were found to monitor and adjust to student needs more closely and to teach to a clearly defined objective more frequently. However, it will be necessary to define more precisely the meanings and standards for judging such behavior before any definitive policy statements can be made.

In determining the correct policy conclusions which can reasonably be drawn from the study, it is most important to view the findings as related to one another and to other research studies rather than as standing alone. A clear example is provided in the preliminary findings of this study which suggest that higher-achieving schools use a moderate number and size of groups per classroom and that lower-achieving schools report more and smaller instructional groups. As asserted in Chapter II, other researchers have found that the connection between numbers of groups and achievement relates more to the increased ability of teachers to monitor a few larger groups of children than to any dynamic inherent in group size itself. Therefore, all schools--whether they provide individualized instruction or not--should consider the importance of training teachers to monitor and oversee student learning and progress.

The data on direct instruction in specific subjects generally remain too unstable for making policy determinations. The only consistently clear piece of information which has developed is the relationship between amount of social studies and higher achievement. A significant difference exists in the expected direction (that is, more instruction in higher-achieving schools), and other recent research seems to highlight this relationship. Policy considerations would lead to an assertion that it is not social studies instruction per se which accounts for increased learning but the use of social studies as another discipline supplementing and complementing reading instruction which makes it an important factor in general achievement.

No definitive statement can be made at this point regarding the seemingly contradictory findings that students in lower-achieving schools receive more instruction in mathematics than do students in higher-achieving schools. Any venture at a guess would be foolhardy and frivolous at this time; therefore, the question must be left open for additional study.

In addition to further assessment of the role of instructional time in mathematics as related to achievement, study in several other areas is also recommended. Further study is recommended of the nature and implementation of individualized instruction, with particular attention being given to the quality of adult supervision of children working in the individualized mode. Also recommended is the collection of additional information regarding the quality and extent of training for aides to supplement our data and additional analysis of the summer school data gathered in this study. All of these issues are of primary interest; yet limited resources preclude an examination of all of the issues in depth at the present time.

In summary, this report contains a description of a number of variables deemed significant for affecting student achievement. The extent and impact of each variable has been indicated. It is hoped that school administrators and teachers will find this work beneficial and useful. In the meantime, the Department of Education has found this study useful as a springboard for its own research. In the coming months an analysis will be made of second-year data in an attempt to seek extensions and alternative explanations for several of the findings. Additionally, other findings are expected to form the basis for some of the special studies conducted by the Department's Office of Program Evaluation and Research as part of the consolidated evaluation process. For scholars in education it is hoped that this report will contribute to their search for additional variables contributing to school effectiveness.

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Appendix A
Further Information on Design and Methodology

The general design, methodology, findings, and policy recommendations of this study have been discussed. In this appendix is presented additional information more technical in nature for persons interested in studying the design and methodology more closely.

1. Test Scores

In Table A-1 we present a listing of the sixth-grade achievement scores for each of the 21 sampled pairs of schools. For each pair the first school is the "above-prediction" school; the second school is the "below-prediction" school.

For each set of schools we have provided mean scores in reading, language, written expression, and spelling for each of seven years. Although the original selection of schools included data in all four testing areas, it used only scores from the years 1972-73 and 1973-74. The remaining years' scores are presented for comparison and research.

In the seven-year span covered in the data, two different tests have been used. From 1969-70 through 1973-74, sixth graders were administered the Comprehensive Tests of Basic Skills, Form Q, Level 2; and from 1974-75 through 1975-76, they were administered the Survey of Basic Skills.

In the listing three pairs of schools--E, T, and X--are not included. These represent the three pairs discussed in Chapter III which were eliminated from the study after the original selection of 24 pairs.

Included in several categories of Table A-1 is either the letter M or a triple asterisk (***). The M refers to data which are not available and apparently have never been collected. In the early years of the California Assessment Program (1969--72), the Department did not send state-developed tests to the districts. Instead, the local schools were to administer publishers' tests and send the results to the Department of Education. In some cases, the Department did not receive these scores, and, as a result, they are recorded as an M.

The triple asterisk occurs only for the lower-achieving school of Pair G in language and spelling, 1972-73. A check of Department of Education computer records indicates that only one child took the language test and none took the spelling test. The Department is unable to account for this occurrence because the computer program for sample selection specified that only schools with more than 16 students tested in each subject area would be eligible for participation. A rechecking of records reveals that the lower-achieving school in Pair G does meet the minimum standard for all other tests and years. Therefore, on the basis of the seven-year data, it was determined that the selection was appropriate.

2. Hypothesis Testing

Additionally, in tables A-2 through A-11 a series of tables displaying a typical analysis of the study is presented. The vector displayed is entitled principal support, which measured the behavioral characteristics of principals toward teachers and the school community.

In the tables in Appendix A are presented (1) a univariate analysis of variance for each of the components within the principal-support vector; and (2) an analysis of the vector itself in a multivariate analysis of variance. In each of the univariate and the multivariate analyses were used planned comparisons and conducted hypothesis testing at the level of $\alpha = .05$ per family of hypotheses.

In these analyses was presented standard tables, including the correlation coefficient (W^2) as a ratio of the variance explained by each variable to the total variance. Also present was another statistic, the coefficient of partial correlation (W_p^2) as the ratio of the variance explained by each hypothesis to the sum of the variance of the hypothesis plus error variance. The rationale for inclusion of this latter variable is that the variance accounted for by the background variables is removed and then the remaining variance is focused on as that which can be explained by educational variables. Then the portion of variance which is unexplained by background can be explained by particular educational variables.

3. Vector Composites

In the analysis of the data, individual items were combined into a series of vector combinations, and those combinations were subsequently labeled. Table A-12 contains a list of the ten major composites and their P-values.

TABLE A-1

Summary of Sixth-Grade Achievement Scores for the Forty-two Schools in the School Effectiveness Study, 1969-70 through 1975-76

School Pair	*Selection Characteristics				READING							LANGUAGE						
	SES	Locale	Minority	Size	Year							Year						
					69-70	70-71	71-72	72-73	73-74	74-75	75-76	69-70	70-71	71-72	72-73	73-74	74-75	75-76
A	1	1	3	1	52.4	47.2	44.3	46.6	48.0	45.4	55.1	54.5	47.2	45.6	43.9	49.2	44.1	57.7
					42.6	37.9	41.3	36.3	37.9	36.1	45.4	46.2	36.8	42.8	35.6	33.9	41.5	44.6
B	1	1	2	2	59.1	M	63.0	65.3	61.8	64.5	70.8	55.6	M	60.3	66.1	59.0	54.5	66.0
					***1	49.2	45.8	52.6	45.4	46.1	58.3	M	43.2	41.6	44.1	41.8	44.9	49.6
C	1	1	3	3	47.7	46.0	51.3	52.3	50.0	47.7	52.9	51.2	M	52.2	52.9	48.0	49.2	55.7
					39.7	38.7	39.8	38.2	36.7	33.7	48.3	38.4	38.3	39.1	37.5	37.0	34.0	43.8
D	1	1	3	3	38.2	46.6	45.2	45.2	49.3	56.6	62.8	39.1	45.7	45.3	44.5	50.6	52.9	60.0
					44.4	40.5	36.8	36.5	34.9	37.1	45.7	44.3	40.6	36.0	35.4	32.9	35.1	41.3
E	1	2	3	2	51.4	50.0	53.6	56.0	55.2	46.3	57.8	52.5	49.2	50.8	51.4	51.4	47.5	63.0
					42.7	40.1	40.8	38.4	36.9	38.8	50.7	43.7	40.5	40.2	35.3	30.4	39.1	53.2
G	1	2	3	3	47.2	47.1	44.8	57.1	52.3	47.8	60.4	47.9	46.1	43.3	54.7	51.4	47.0	52.6
					40.2	38.0	41.3	40.0	35.3	38.3	42.2	39.4	40.8	41.4	***	30.3	37.2	44.4
H	1	3	1	1	57.6	51.6	45.7	56.6	62.2	52.6	65.6	52.6	45.1	43.7	53.5	59.3	56.8	68.8
					49.3	51.5	50.2	49.8	49.3	61.5	70.0	45.0	50.4	44.5	44.8	41.3	50.8	61.2
I	1	3	2	1	51.8	48.6	49.3	50.3	54.1	53.7	57.4	50.0	47.9	44.3	49.9	52.6	56.0	58.0
					44.6	55.6	50.4	43.9	46.0	62.4	50.0	43.6	53.2	38.2	41.2	41.4	57.9	47.8
J	1	3	3	1	49.9	49.9	M	51.8	52.5	57.6	64.9	51.4	48.7	M	49.5	51.3	47.9	62.8
					47.3	48.0	41.0	35.6	42.0	45.1	40.9	44.7	46.7	37.4	33.0	36.1	45.7	44.4
K	2	1	2	1	66.8	67.2	64.1	65.3	63.1	69.6	65.9	62.1	62.5	58.7	60.1	59.3	56.4	62.8
					52.5	48.4	51.3	50.5	46.4	44.4	64.4	49.1	47.7	48.1	48.7	46.3	40.2	69.2
L	2	1	2	2	62.9	65.6	60.7	65.9	66.8	62.9	69.9	61.3	63.8	59.0	61.0	64.4	60.3	76.7
					48.7	51.9	48.8	48.9	51.0	50.2	57.4	45.1	49.4	45.1	45.5	50.6	45.8	48.0
M	2	1	3	2	54.6	53.7	51.9	52.7	54.1	45.6	61.5	54.6	53.5	51.7	52.4	53.5	45.4	57.3
					51.2	49.0	45.4	42.7	39.1	37.2	52.6	50.6	48.9	44.6	40.5	39.1	36.8	43.8
N	2	2	2	2	62.3	64.2	61.9	64.3	63.2	63.2	68.6	60.7	62.6	57.9	59.3	58.4	59.1	68.8
					50.2	49.5	46.0	51.3	50.5	55.3	65.6	49.3	41.5	41.7	47.5	45.7	51.3	60.0
O	2	2	2	3	M	67.8	67.9	65.8	67.4	60.1	69.3	M	62.8	61.6	59.8	59.6	52.1	69.9
					61.7	56.9	55.6	50.9	52.7	53.3	64.4	57.0	51.0	49.3	47.9	49.9	50.3	61.9
P	2	3	1	1	M	M	M	61.1	61.5	60.7	71.3	M	M	M	56.6	56.6	64.1	66.8
					55.6	51.0	45.7	53.6	54.3	58.2	61.6	55.0	50.8	24.7	50.6	43.4	51.0	61.6
Q	3	1	1	2	65.7	62.4	65.6	67.4	64.2	65.4	75.6	63.7	59.9	61.3	64.0	61.8	57.2	67.4
					56.7	58.4	54.2	56.3	48.8	60.2	62.0	54.6	53.9	49.3	53.5	46.0	50.0	63.9
R	3	1	1	3	68.3	69.7	68.5	69.9	69.8	71.3	79.4	65.9	68.0	67.4	69.1	67.3	70.0	78.3
					61.0	61.6	61.3	57.6	54.8	63.0	74.4	60.2	61.1	58.2	54.7	50.8	58.3	68.4
S	3	1	2	3	67.9	70.4	68.0	70.8	70.0	66.1	75.1	64.3	66.1	63.6	64.4	63.2	61.7	70.6
					61.4	61.8	57.9	57.7	56.0	63.3	71.0	59.2	57.0	55.3	55.5	53.9	56.6	70.7
U	3	2	1	2	68.7	67.8	67.2	67.4	68.7	68.4	75.2	67.0	65.1	64.7	63.9	65.8	61.7	70.6
					62.4	66.5	63.7	57.6	58.9	66.6	73.4	59.4	64.8	58.7	55.5	57.2	60.7	71.8
V	3	2	1	3	70.4	68.6	63.4	65.7	69.2	70.4	80.7	67.6	66.7	60.1	64.8	67.2	63.4	79.9
					63.8	62.2	57.3	55.7	56.4	58.9	65.8	56.3	60.0	52.5	52.0	57.2	53.9	63.7
W	3	2	1	3	63.9	64.5	64.5	64.1	65.7	62.7	71.1	60.9	60.5	62.5	62.1	65.6	61.1	72.0
					M	58.2	57.4	53.8	57.3	53.7	64.2	M	55.6	54.1	48.4	51.8	49.5	63.9

School Pair	MATHEMATICS						
	Year						
	69-70	70-71	71-72	72-73	73-74	74-75	75-76
A	63.5	59.1	56.6	53.9	62.4	38.1	42.9
	53.8	52.1	54.2	47.9	48.8	39.2	42.5
B	70.8	M	75.6	79.1	73.4	50.5	61.8
	M	59.7	53.4	58.9	51.0	43.2	41.5
C	65.0	M	67.5	64.5	62.8	45.2	47.2
	52.7	52.7	52.9	50.8	49.8	38.0	47.1
D	51.1	55.3	52.3	51.7	59.0	52.6	56.0
	57.4	49.9	44.5	48.2	46.6	38.4	42.3
E	67.9	62.5	62.9	57.3	64.3	45.6	55.9
	53.3	55.4	54.3	49.8	46.6	38.2	49.3
G	61.7	58.3	55.9	65.8	65.5	41.9	49.3
	55.4	54.3	61.6	53.1	53.7	41.6	46.9
H	74.7	63.5	58.3	65.4	73.3	46.2	57.5
	64.1	59.6	57.1	59.2	57.5	53.3	57.6
I	65.8	69.3	68.1	68.6	74.1	52.4	49.1
	57.7	67.8	58.2	53.5	58.9	54.1	42.4
J	64.0	68.9	M	66.0	71.1	56.7	59.1
	66.4	60.0	51.1	43.7	45.9	39.7	39.0
K	75.8	75.0	69.1	71.2	68.1	52.1	51.1
	65.3	63.9	62.6	61.5	60.0	45.2	61.3
L	76.6	79.4	71.7	79.1	77.4	55.6	72.2
	61.5	62.5	61.7	57.2	63.6	42.9	45.2
M	68.4	65.9	67.5	66.1	61.7	43.6	27.0
	66.0	61.1	53.4	51.8	53.6	35.9	38.2
N	77.3	75.0	68.3	71.7	73.9	57.1	50.6
	54.8	59.1	57.6	60.3	60.6	47.7	53.8
O	M	77.5	77.3	75.4	74.7	52.3	65.9
	72.3	64.0	66.8	60.9	66.1	49.1	60.8
P	M	M	M	74.9	71.5	53.4	61.7
	70.6	66.9	57.3	59.6	62.3	48.2	80.5
Q	79.3	74.9	72.3	78.6	74.8	55.1	69.6
	70.4	71.0	63.7	65.3	59.9	51.5	51.9
R	82.7	82.7	81.8	81.6	78.8	65.1	74.5
	75.2	75.0	71.5	67.3	67.5	58.8	69.5
S	79.1	80.4	77.2	82.1	79.9	61.1	68.8
	78.8	70.0	64.6	70.6	67.2	53.0	59.5
U	84.5	82.4	81.6	78.5	84.2	60.1	70.8
	76.8	78.4	71.0	65.8	69.6	52.5	61.2
V	80.6	80.5	77.4	78.1	83.7	57.8	75.7
	72.3	74.3	69.9	67.9	70.5	51.4	66.5
W	80.0	75.8	77.7	77.0	79.5	57.9	69.7
	M	67.9	58.8	60.7	63.8	46.3	52.7

* SES: 1 = low
2 = medium
3 = high

Locale: 1 = city
2 = suburb
3 = rural

Minority: 1 = small percentage
2 = moderate percentage
3 = high percentage

Size: 1 = small 6th grade
2 = medium 6th grade
3 = large 6th grade

**M = No data available
*** See Explanation in text.

TABLE A-2

Analysis of Variance
Principal Support: Helping Teachers with New Ideas (TI 15 A)

Source	df	SS	MS	F	$\hat{\omega}^2$	$\hat{\omega}_p^2$
Achievement						
High v. Low	1	11.96	11.96	10.09*	.02	.03
Background Factors						
City v. Rural	1	0.10	0.10	0.08		
Suburb v. City & Rural	1	9.83	9.83	8.29**	.02	.03
Middle SES v. High SES	1	0.11	0.11	0.09		
Low SES v. Middle & High SES	1	4.92	4.92	4.15		
Low Minority v. Middle Minority	1	1.85	1.85	1.56		
High Minority v. Low & Middle Minority	1	2.93	2.93	2.47		
School Size	2	29.30	14.65	No Test		
Interaction of Achievement with Background Factors						
Achievement x (City v. Rural)	1	3.69	3.69	3.11		
Achievement x (Suburb v. City & Rural)	1	1.20	1.20	1.01		
Achievement x (Middle SES v. High SES)	1	14.89	14.89	12.56**	.03	.04
Achievement x (Low SES v. Middle & High SES)	1	3.04	3.04	2.56		
Achievement x (Low Minority v. Middle Minority)	1	0.92	0.92	0.77		
Achievement x (High Minority v. Low & Middle Minority)	1	1.81	1.81	1.52		
Achievement x (School Size)	2	26.76	13.38	No Test		
Interaction of Background Factors With One Another	20	47.29	2.36			
Within Cells	312	371.28	1.19			
Total	349	531.88	1.52			

* p .05
** p .0083

TABLE A-3

Principal Support: Backing Up Teachers on Student Discipline

(TI 15 B)

Source	df	SS	MS	F	$\hat{\omega}^2$	$\hat{\omega}_p^2$
Achievement						
High v. Low	1	11.69	11.69	12.81*	.02	.04
Background Factors						
City v. Rural	1	15.23	15.23	16.69**	.03	.05
Suburb v. City & Rural	1	0.17	0.17	0.19		
Middle SES v. High SES	1	0.07	0.07	0.07		
Low SES v. Middle & High SES	1	1.76	1.76	1.93		
Low Minority v. Middle Minority	1	1.00	1.00	1.10		
High Minority v. Low & Middle Minority	1	0.02	0.02	0.02		
School Size	2	82.22	41.11	No Test		
Interaction of Achievement with Background Factors						
Achievement x (City v. Rural)	1	5.08	5.08	5.56		
Achievement x (Suburb v. City & Rural)	1	2.03	2.03	2.22		
Achievement x (Middle SES v. High SES)	1	1.41	1.41	1.55		
Achievement x (Low SES v. Middle & High SES)	1	2.70	2.70	2.96		
Achievement x (Low Minority v. Middle Minority)	1	0.02	0.02	0.02		
Achievement x (High Minority v. Low & Middle Minority)	1	2.38	2.38	2.61		
Achievement x (School Size)	2	20.44	10.22	No Test		
Interaction of Background Factors with One Another	20	61.95	3.10			
Within Cells	312	283.92	.91			
Total	349	492.09	1.41			

* $p < .05$
** $p < .0083$

TABLE A-4

Principal Support: Supporting Special Projects

(TI 15·C)

Source	df	SS	MS	F	$\hat{\omega}^2$	$\hat{\omega}_p^2$
Achievement						
High v. Low	1	9.58	9.58	9.72*	.02	.03
Background Factors						
City v. Rural	1	0.02	0.02	0.02		
Suburb v. City & Rural	1	0.07	0.07	0.07		
Middle SES v. High SES	1	3.50	3.50	3.55		
Low SES v. Middle & High SES	1	3.12	3.12	3.17		
Low Minority v. Middle Minority	1	0.22	0.22	0.23		
High Minority v. Low & Middle Minority	1	4.83	4.83	4.90		
School Size	2	13.16	6.58	No Test		
Interaction of Achievement with Background Factors						
Achievement x (City v. Rural)	1	0.58	0.58	0.59		
Achievement x (Suburb v. City & Rural)	1	0.00	0.00	0.00		
Achievement x (Middle SES v. High SES)	1	0.29	0.29	0.29		
Achievement x (Low SES v. Middle & High SES)	1	1.58	1.58	1.60		
Achievement x (Low Minority v. Middle Minority)	1	0.01	0.01	0.01		
Achievement x (High Minority v. Low & Middle Minority)	1	1.53	1.53	1.55		
Achievement x (School Size)	2	2.64	1.32	No Test		
Interaction of Background Factors with One Another	20	44.36	2.22			
Within Cells	312	308.88	.99			
Total	349	394.37				

* $p < .05$
** $p < .0083$

TABLE A-5

Principal Support: Relations with Parents, Community

(TI 15 D)

Source	df	SS	MS	F	$\hat{\omega}^2$	$\hat{\omega}_p^2$
Achievement						
High v. Low	1	18.87	18.87	22.14*	.05	.07
Background Factors						
City v. Rural	1	0.18	0.18	0.22		
Suburb v. City & Rural	1	3.90	3.90	4.57		
Middle SES v. High SES	1	0.07	0.07	0.08		
Low SES v. Middle & High SES	1	0.53	0.53	0.62		
Low Minority v. Middle Minority	1	0.83	0.83	0.97		
High Minority v. Low & Middle Minority	1	0.08	0.08	0.09		
School Size	2	25.64	12.82	No Test		
Interaction of Achievement with Background Factors						
Achievement x (City v. Rural)	1	7.02	7.02	8.24**	.02	.03
Achievement x (Suburb v. City & Rural)	1	1.67	1.67	1.96		
Achievement x (Middle SES v. High SES)	1	3.75	3.75	4.40		
Achievement x (Low SES v. Middle & High SES)	1	0.51	0.51	0.60		
Achievement x (Low Minority v. Middle Minority)	1	0.59	0.59	0.69		
Achievement x (High Minority v. Low & Middle Minority)	1	1.05	1.05	1.23		
Achievement x (School Size)	2	5.94	2.97	No Test		
Interaction of Background Factors with One Another	20	39.00	1.95			
Within Cells	312	265.2	.85			
Total	349	374.83	1.07			

* $p < .05$
** $p < .0083$

TABLE A-6

Principal Support: Report Keeping

(TI 15 E)

Source	df	SS	MS	F	$\hat{\omega}^2$	$\hat{\omega}_p^2$
Achievement						
High v. Low	1	2.13	2.13	1.93		
Background Factors						
City v. Rural	1	6.58	6.58	5.94		
Suburb v. City & Rural	1	17.70	17.70	15.997**	.03	.05
Middle SES v. High SES	1	4.98	4.98	4.50		
Low SES v. Middle & High SES	1	3.41	3.41	3.08		
Low Minority v. Middle Minority	1	0.53	0.53	0.48		
High Minority v. Low & Middle Minority	1	0.06	0.06	0.06		
School Size	2	54.04	27.02	No Test		
Interaction of Achievement with Background Factors						
Achievement x (City v. Rural)	1	1.61	1.60	1.45		
Achievement x (Suburb v. City & Rural)	1	0.004	0.00	0.00		
Achievement x (Middle SES v. High SES)	1	8.18	8.18	7.39**	.02	.02
Achievement x (Low SES v. Middle & High SES)	1	1.86	1.86	1.681		
Achievement x (Low Minority v. Middle Minority)	1	1.73	1.73	1.56		
Achievement x (High Minority v. Low & Middle Minority)	1	1.16	1.16	1.05		
Achievement x (School Size)	2	9.80	4.90	No Test		
Interaction of Background Factors with One Another	20	45.91	2.30			
Within Cells	312	346.32	1.11			
Total	349	506.05	1.45			

* $p < .05$
** $p < .0083$

TABLE A-7

Principal Support: Support for Teaching Staff

(TI 20 A)

Source	df	SS	MS	F	$\hat{\omega}^2$	$\hat{\omega}_p^2$
Achievement						
High v. Low	1	11.22	11.2	13.43*	.03	.04
Background Factors						
City v. Rural	1	1.86	1.86	2.22		
Suburb v. City & Rural	1	0.00	0.00	0.00		
Middle SES v. High SES	1	0.73	0.73	0.87		
Low SES v. Middle & High SES	1	0.05	0.05	0.06		
Low Minority v. Middle Minority	1	0.01	0.01	0.01		
High Minority v. Low & Middle Minority	1	1.99	1.99	2.38		
School Size	2	21.52	10.76	No Test		
Interaction of Achievement with Background Factors						
Achievement x (City v. Rural)	1	0.95	0.95	1.14		
Achievement x (Suburb v. City & Rural)	1	2.65	2.65	3.17		
Achievement x (Middle SES v. High SES)	1	6.12	6.12	7.33**	.02	.02
Achievement x (Low SES v. Middle & High SES)	1	5.08	5.08	6.08		
Achievement x (Low Minority v. Middle Minority)	1	2.33	2.33	2.79		
Achievement x (High Minority v. Low & Middle Minority)	1	3.54	3.54	4.24		
Achievement x (School Size)	2	1.00	0.50	No Test		
Interaction of Background Factors with One Another	20	59.28	2.96			
Within Cells	312	262.08	.84			
Total	349	380.41	1.09			

* $p < .05$
** $p < .0083$

TABLE A-8

Principal Support: Attendance and Discipline of Students (TI 20 C)

Source	df	SS	MS	F	$\hat{\omega}^2$	$\hat{\omega}_p^2$
Achievement						
High v. Low	1	8.13	8.13	10.27*	.02	.03
Background Factors						
City v. Rural	1	7.63	7.63	9.63**	.02	.03
Suburb v. City & Rural	1	2.25	2.25	2.84		
Middle SES v. High SES	1	0.06	0.06	0.08		
Low SES v. Middle & High SES	1	4.51	4.51	5.69		
Low Minority v. Middle Minority	1	0.67	0.67	0.85		
High Minority v. Low & Middle Minority	1	0.23	0.23	0.29		
School Size	2	99.90	49.95	No Test		
Interaction of Achievement with Background Factors						
Achievement x (City v. Rural)	1	1.37	1.37	1.73		
Achievement x (Suburb v. City & Rural)	1	2.64	2.64	3.34		
Achievement x (Middle SES v. High SES)	1	2.67	2.67	3.38		
Achievement x (Low SES v. Middle & High SES)	1	3.07	3.07	3.87		
Achievement x (Low Minority v. Middle Minority)	1	0.02	0.02	0.02		
Achievement x (High Minority v. Low & Middle Minority)	1	1.42	1.42	1.79		
Achievement x (School Size)	2	17.72	8.86	No Test		
Interaction of Background Factors with One Another	20	33.99	1.70			
Within Cells	312	246.48	.79			
Total	349	432.76	1.24			

* $p < .05$
** $p < .0083$

TABLE A-9

Principal Support: Instructional Leadership

TI 20 D)

Source	df	SS	MS	F	$\hat{\omega}^2$	$\hat{\omega}_p^2$
Achievement						
High v. Low	1	10.33	10.33	8.27*	.02	.03
Background Factors						
City v. Rural	1	0.03	0.03	0.02		
Suburb v. City & Rural	1	5.31	5.31	4.25		
Middle SES v. High SES	1	0.30	0.30	0.24		
Low SES v. Middle & High SES	1	3.10	3.10	2.48		
Low Minority v. Middle Minority	1	0.90	0.90	0.72		
High Minority v. Low & Middle Minority	1	0.34	0.34	0.27		
School Size	2	25.18	12.59	No Test		
Interaction of Achievement with Background Factors						
Achievement x (City v. Rural)	1	0.10	0.10	0.08		
Achievement x (Suburb v. City & Rural)	1	2.91	2.91	2.33		
Achievement x (Middle SES v. High SES)	1	4.17	4.17	3.34		
Achievement x (Low SES v. Middle & High SLS)	1	0.40	0.40	0.32		
Achievement x (Low Minority v. Middle Minority)	1	2.14	2.14	1.71		
Achievement x (High Minority v. Low & Middle Minority)	1	0.59	0.59	0.47		
Achievement x (School Size)	2	2.14	1.07	No Test		
Interaction of Background Factors with One Another	20	99.99	5.00			
Within Cells	312	390.	1.25			
Total	349	547.93				

59

* $p < .05$
** $p < .0083$

TABLE A-10

Principal Support: Distribution of Materials

(TI 20 F)

Source	df	SS	MS	F	$\hat{\omega}^2$	$\hat{\omega}_p^2$
Achievement						
High v. Low	1	4.79	4.79	5.53*	.01	.02
Background Factors						
City v. Rural	1	0.65	0.65	0.75		
Suburb v. City & Rural	1	3.35	3.35	3.86		
Middle SES v. High SES	1	1.35	1.35	1.56		
Low SES v. Middle & High SES	1	0.00	0.00	0.00		
Low Minority v. Middle Minority	1	2.64	2.64	3.05		
High Minority v. Low & Middle Minority	1	0.65	0.65	0.75		
School Size	2	19.88	9.94	No Test		
Interaction of Achievement with Background Factors						
Achievement x (City v. Rural)	1	0.34	0.34	0.39		
Achievement x (Suburb v. City & Rural)	1	2.41	2.41	2.78		
Achievement x (Middle SES v. High SES)	1	5.73	5.73	6.61		
Achievement x (Low SES v. Middle & High SES)	1	0.03	0.03	0.03		
Achievement x (Low Minority v. Middle Minority)	1	0.84	0.84	0.97		
Achievement x (High Minority v. Low & Middle Minority)	1	1.51	1.51	1.74		
Achievement x (School Size)	2	.62	0.31	No Test		
Interaction of Background Factors with One Another	20	46.73	2.34			
Within Cells	312	271.44	.87			
Total	349	362.96	1.04			

* $p < .05$
** $p < .0083$

TABLE A-11

Principal Support

Source	F
Achievement	
High v. Low	2.99*
Background Factors	
City v. Rural	3.74**
Suburb v. City & Rural	3.09**
Middle SES v. High SES	2.25
Low SES v. Middle & High SES	2.74**
Low Minority v. Middle Minority	1.38
High Minority v. Low & Middle Minority	1.93
School Size	No Test
Interaction of Achievement with Background Factors	
Achievement x (City v. Rural)	1.80
Achievement x (Suburb v. City & Rural)	2.59**
Achievement x (Middle SES v. High SES)	2.43
Achievement x (Low SES v. Middle & High SES)	1.31
Achievement x (Low Minority v. Middle Minority)	0.73
Achievement x (High Minority v. Low & Middle Minority)	2.20
Achievement x (School Size)	No Test

* $p < .05$
** $p < .0083$

Table A-12

Composite Name, by P-Value

Composite name	P-value
Principal support	.0002
Teacher effort	.0003
Classroom atmosphere	.0001
Amount of time spent on various subjects	.0042
Use of teacher aides	.0001
Accessibility of materials	.0002
Faculty influence	.0001
District administration	.0004
Grouping practices	.0075
Teacher satisfaction	.0545

Appendix B
A Guide to Statistical Terms

Throughout this report a number of statistical and technical terms have been used to describe various procedures. In the preparation of this report, a quandary developed over whether to use these technical terms or to substitute simpler language. The final decision was to use the technical terms for accuracy and for the benefit of educational researchers who will read this report and draw conclusions regarding its merit. However, at the same time it is recognized that a number of others will read this report with an eye less to the design strategies employed and more to the practical implications for schools and school districts. It is for this second group that a listing of terms and definitions has been developed:

ANALYSIS OF VARIANCE: A method of identifying, breaking down, and testing for statistically significant differences between two or more groups. Some differences are due to the research method used, some to error, and some to school practices. Analysis of variance techniques help researchers learn how much of the difference is attributable to each.

COLEMAN REPORT: The popular name for the Equality of Educational Opportunity report. In 1964 the U.S. Congress mandated a study of the availability of educational facilities and opportunities for children of different races. In addition to analyzing school resources, James Coleman, the author of the report, also discussed schooling's effect on achievement scores. In doing so, he stated that differences in achievement were related more to differences in children's home background than to differences in educational opportunities.

CORRELATION: A measure of the degree of similarity of one group to another. Most correlations range from -1.00 through 0 to +1.00. A correlation of +1.00 indicates a perfect positive relation; -1.00, a perfect negative relation; and 0, no relation.

CURVE OF BEST FIT: The shape of the line which most closely connects the variables of a group when they are displayed in a scatterplot. Before determining the appropriate statistical analysis, one often arrays the data in charted form to determine the appropriate statistical technique.

INDEPENDENT AND DEPENDENT VARIABLES: Names used to categorize variables. "An independent variable is the presumed cause of the dependent variable; the presumed effect. The independent variable is the antecedent; the dependent is the consequent. When we say: If A, then B, we have the conditioned conjunction of an independent variable (A) and a dependent variable (B).[1] In the present study student achievement is the dependent variable. Children's home background, IQ, and family income are independent variables. A search is being conducted for additional independent variables (that is, school factors) which might also affect achievement.

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[1]Fred N. Kerlinger, Foundations of Behavioral Research. New York: Holt, Rinehart, and Winston, 1973.

NATURAL VARIATION: Differences which occur as a matter of course; the opposite of planned or experimental variation. In education, researchers in natural variation studies visit a group of schools and allow them to operate normally. Experimental design, by contrast, would involve setting up two schools or groups of schools and telling administrators and teachers what to do. Most probably, they would be told to operate in exactly the same manner except in one area where their methods would differ systematically. Then researchers could determine if a difference in that area affected achievement. Although experimental design would create a more simple design, a question arises regarding the ethics of submitting young children to experimental situations in an area as important as education.

REGRESSION ANALYSIS: "A method of analyzing the contributions of one or more independent variables to one dependent variable."[2]

RESIDUAL: A score calculated by subtracting the obtained score from the predicted score.

REVIEW OF THE LITERATURE: A summarization of and commentary on the published material in a given field of learning.

SCATTERPLOT: A chart containing two axes on which points are plotted. This provides a pictorial view of the data.

STATISTICAL SIGNIFICANCE: A finding which denotes that the difference between the means of two groups is of such a size that the difference would occur by chance only five times in one hundred trials. Another way of stating the issue: If two groups of persons answered questions randomly, would the difference be as large as the one existing? When it is said that the difference is statistically significant, what is meant is that if the experiment were repeated 100 times and no difference existed between the means, in only five cases would the means show differences as large as those found.

STRATIFICATION OF VARIABLES: Division of variables into subcategories (for example, breaking down schools by size--small, medium, or large; by percentage minority attendance--small, medium, large; or by type of location--rural, suburban, urban).

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[2] Ibid.